

Figure 1

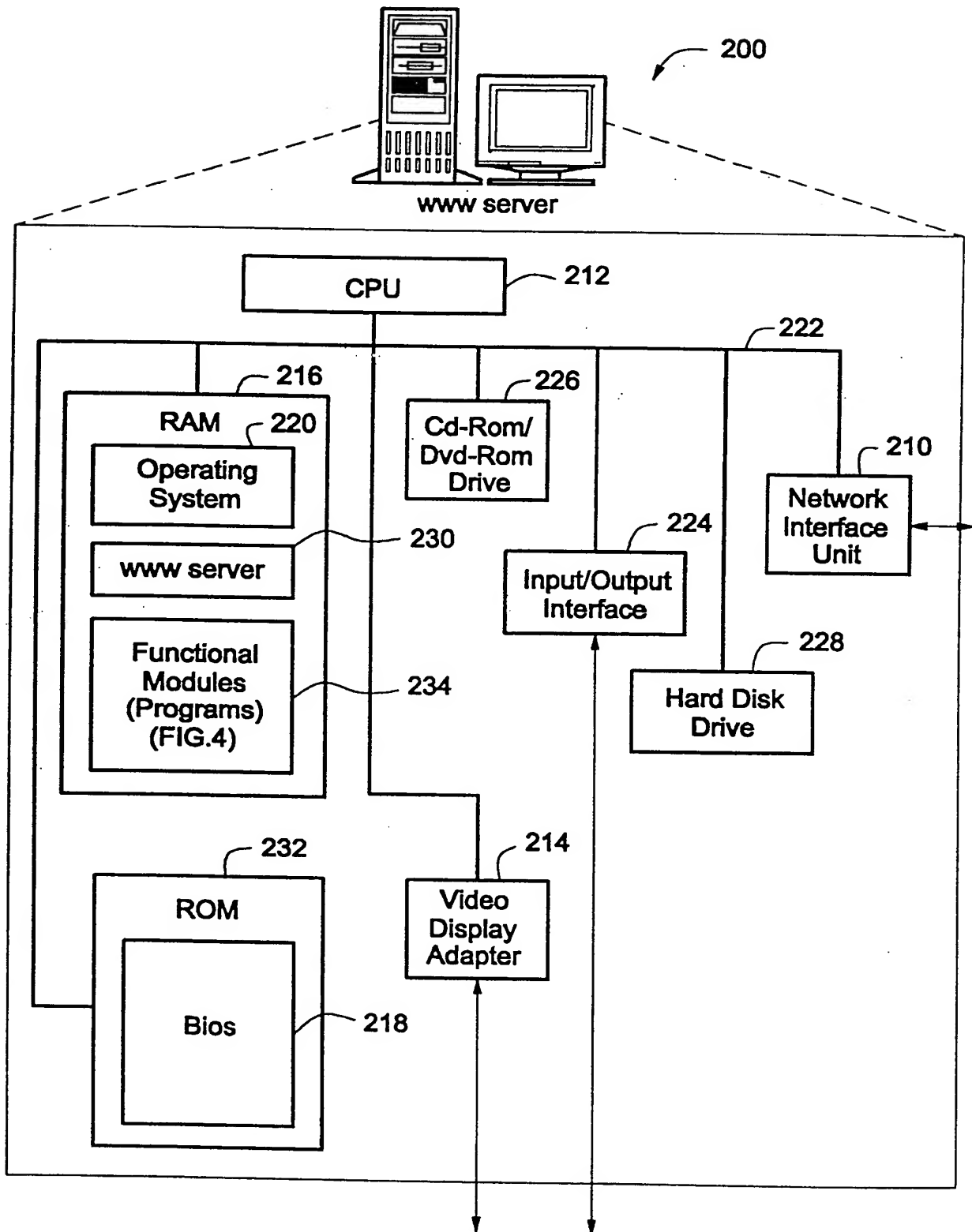


Figure 2

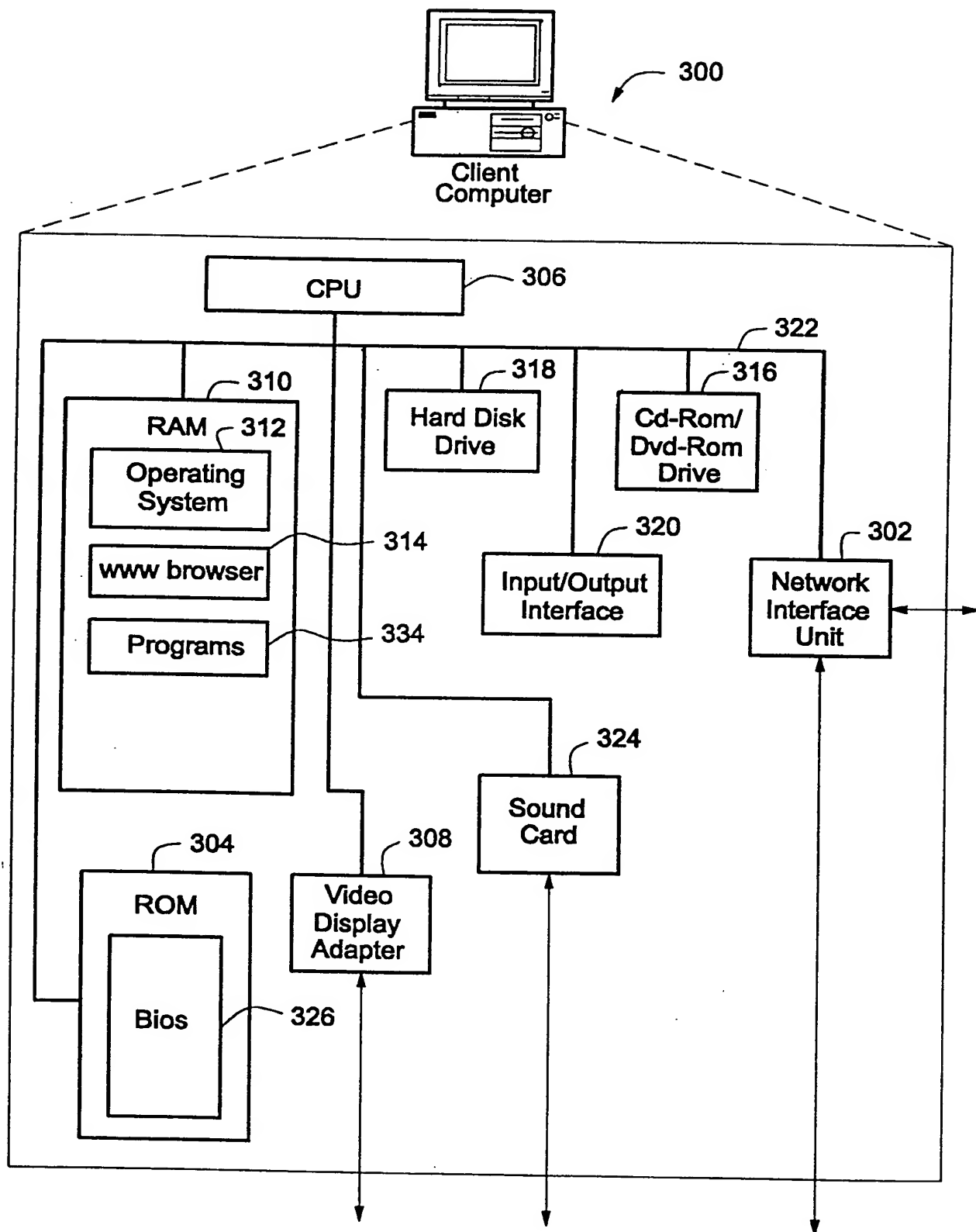


Figure 3

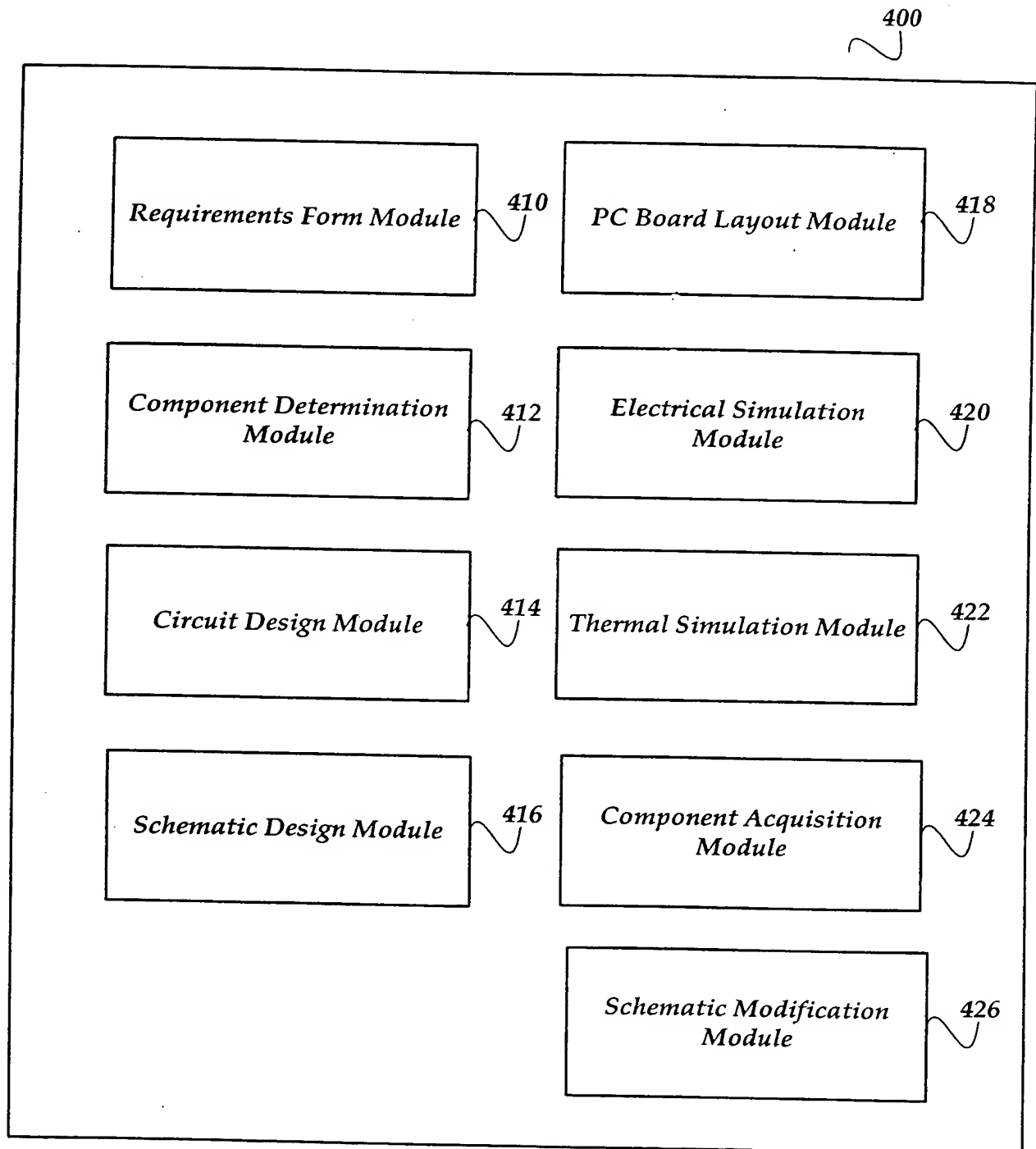


Fig.4

REPLACEMENT SHEET

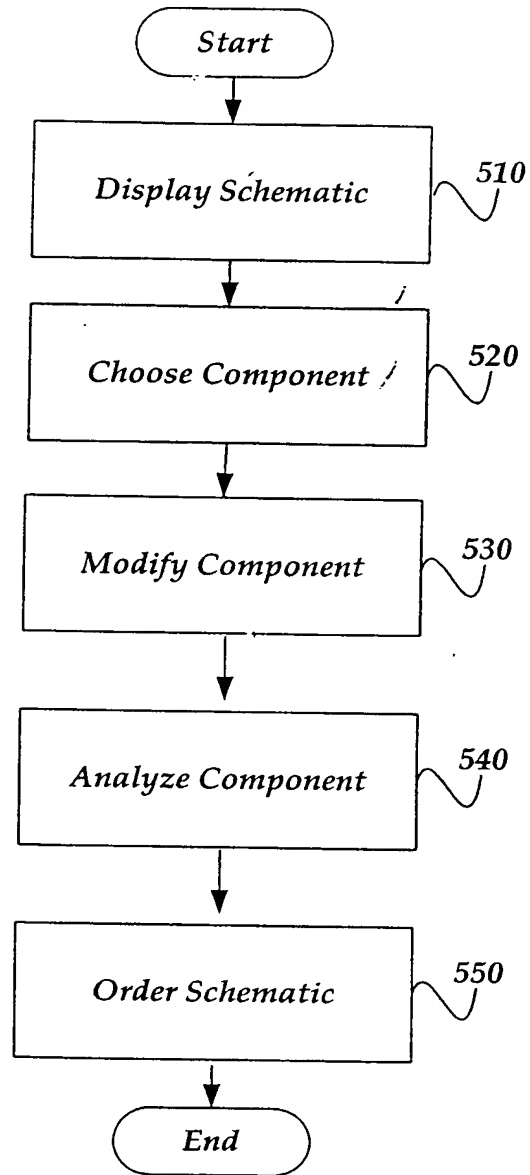
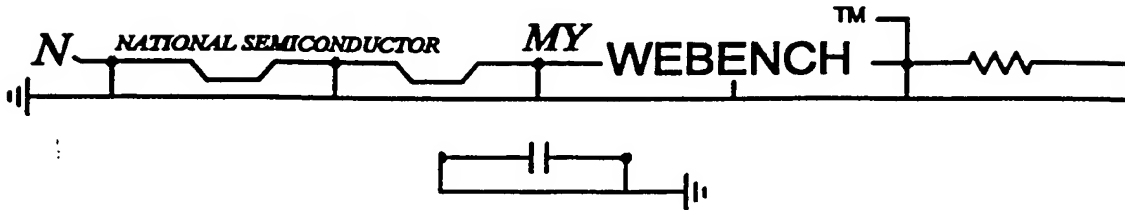


Fig.5

REPLACEMENT SHEET



Welcome to your
power Webench™!

"Tools for the power design engineer"

START HERE — 605
to design a power supply.

How to use Webench

Just four easy steps to design a power supply! Just click on the items below for help on that step.

- 620
> 1 Choose a Part — choose a specific part or input your system specifications to find those devices that fit.
- 630
> 2 Create a Design — a design will be created for you including any necessary passive components and important calculated operating values.
- 640
> 3 Analyze a Design — use WebSim™, the online power simulator, to validate your design electrically, and WebTHERM™, the online thermal simulator to visualize the thermal behavior of your design.
- 650
> 4 Build It! — buy a part, a kit of parts, or an evaluation board.

[See Our Disclaimer](#)

Features

WebSIM™, is a browser-based simulator which allows you to probe points in the

My Designs

Your Last 4 Designs:

- [Design #6](#)
- [Design #5](#)
- [Design #4](#)
- [Design #3](#)

660

MY Designs Shows all of your Designs 670

[My WebSIM™ Simulations](#) — 680

[My WebTHERM™ Simulations](#) — 690

[My BuildIt Order](#) — 695

Other Power Webench Tools

Switchers Made Simple™ is

downloadable software that enables you to develop a complete power supply design on your local PC. This covers Simple Switcher devices and includes discrete component and manufacturer selection.

- [SMS 6.1](#) (for LM267x and LM259x buck regulators, and LM258x and LM2577 boost & flyback regulators) updated!
- [SMS 3.3](#) (for LM257X)

Wireless Webench Tools

- [Wireless Easy PLL Design Assistant](#)

Figure 6

REPLACEMENT SHEET

① Choose a Part

Design Requirements Recommended Parts MY Designs Help

Enter your power supply design requirements.

Basic Selections

702 { Vin Min V
Vin Max V

Output Voltage ▼

V out I out
Output #1 V A } 704

Choose Additional Features (Optional)

706

On/Off Pin ☐ No ☐ Yes ☒ Ignore
Error Flag ☐ No ☐ Yes ☒ Ignore
Sync Pin ☐ No ☐ Yes ☒ Ignore

V out I out
Output 2 V A
Output 3 V A

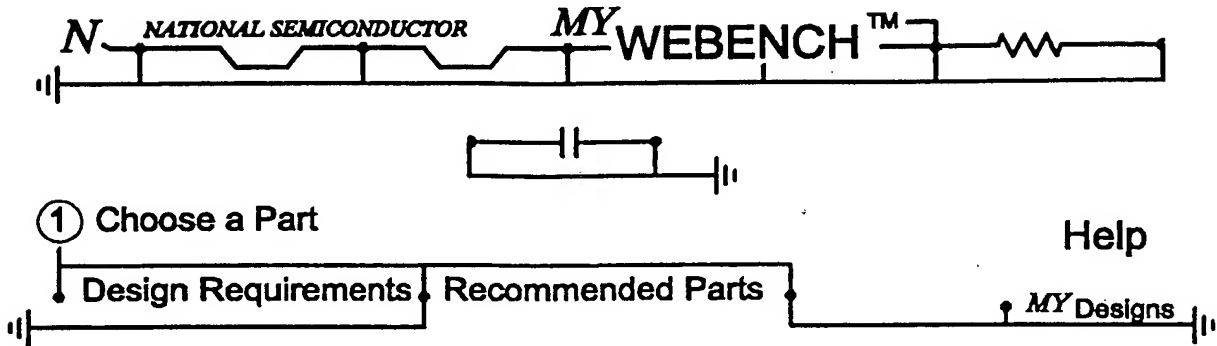
Show Recommended Power Management ICs 708

Quick Search
Parametric Search
See Our Disclaimer
Product Tree
Back to Webench

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Figure 7

REPLACEMENT SHEET



Your Design Specifications

VinMin : 20.0 V VinMax : 22.0 V	Output #1 Vout = 5.00 V Iout = 5.00 A
--	--

Suggested Switching Regulators - Buck Topology

Product Folder	Webench Tools	Max Curr.	Typ. Eff.	On/ Off	Err. Pln	Other Features	Freq. kHz	Est. Price
<u>LM2678-5.0</u>	Create Design	5.0A	84%	Y	Y		260	\$3.84
	WebTHERM™ Enabled Build It - Custom Kit							
<u>LM2678-ADJ</u>	Create Design	5.0A	84%	Y	Y	Adj. Vout	260	\$3.84
	WebTHERM™ Enabled Build It - Custom Kit							
<u>LM2679-5.0</u>	Create Design	5.0A	84%	Y	Y	SoftStart, Adj. Peak Current limit	260	\$4.07
	WebTHERM™ Enabled Build It - Custom Kit							
<u>LM2679-ADJ</u>	Create Design	5.0A	84%	Y	Y	SoftStart, Adj. Peak Current Limit, Adj. Vout	260	\$4.07
	WebTHERM™ Enabled Build It - Custom Kit							

802

Figure 8A

Suggested Switching Regulators - Flyback Topology

Product Folder	Webench Tools	Max Curr.	Typ. Eff.	On/ Off	Err. Pin	Other Features	Freq. kHz	Est. Price
<u>LM2585-5.0</u>	Create Design	3.0A	93%	N	N	SoftStart	100	\$3.42
<u>LM2585-ADJ</u>	Create Design	3.0A	80%	N	N	SoftStart, Adj. Vout	100	\$3.42
<u>LM2586-5.0</u>	Create Design	3.0A	80%	Y	N	Sync, SoftStart	100	\$3.45
<u>LM2586-ADJ</u>	Create Design	3.0A	80%	Y	N	Sync, SoftStart, Adj. Vout	100	\$3.45
<u>LM2587-5.0</u>	Create Design	5.0A	80%	N	N	SoftStart	100	\$4.51
<u>LM2587-ADJ</u>	Create Design	5.0A	80%	N	N	SoftStart, Adj. Vout	100	\$4.51
<u>LM2588-5.0</u>	Create Design	5.0A	80%	Y	N	Sync, SoftStart	100	\$4.61
<u>LM2588-ADJ</u>	Create Design	5.0A	80%	Y	N	Sync, SoftStart, Adj. Vout	100	\$4.61
<u>LM2577-ADJ</u>	Create Design	3.0A	80%	N	N	SoftStart, Adj. Vout	52	\$3.15

Figure 8B



Design - Purchasing - Quality - Company - Jobs
Design - Purchasing - Quality - Company - Jobs

Products > Analog - Regulators > Simple Switchers > LM2679

Product Folder

905

Live Simulation

Buy LM2679-5.0 Evaluation Board

LM2679 SIMPLE SWITCHER 5A Step-Down Voltage Regulator with Adjustable Current Limit

Generic P/N 2679

Contents

- 902 {
- General Description
 - Features
 - Applications
 - Datasheet
 - Package Availability, Models, Samples & Pricing
 - Design Tools

Parametric Table	
Multiple Output Capability	No
On/Off Pin	Yes
Error Flag	Yes
Input Voltage, min (Volt)	8, 15
Input Voltage, max (Volt)	40
Output Current, max	5 Amps
Output Voltage (Volt)	5, 12, 3.30
Adjustable Output Voltage	No, Yes
Switching Frequency (Hz)	260000
Adjustable Switching Frequency	No
Sync Pin	No
Efficiency (%)	84, 92, 82
Flyback	No
Step-up	No
Step-down	Yes

904

Figure 9

REPLACEMENT SHEET

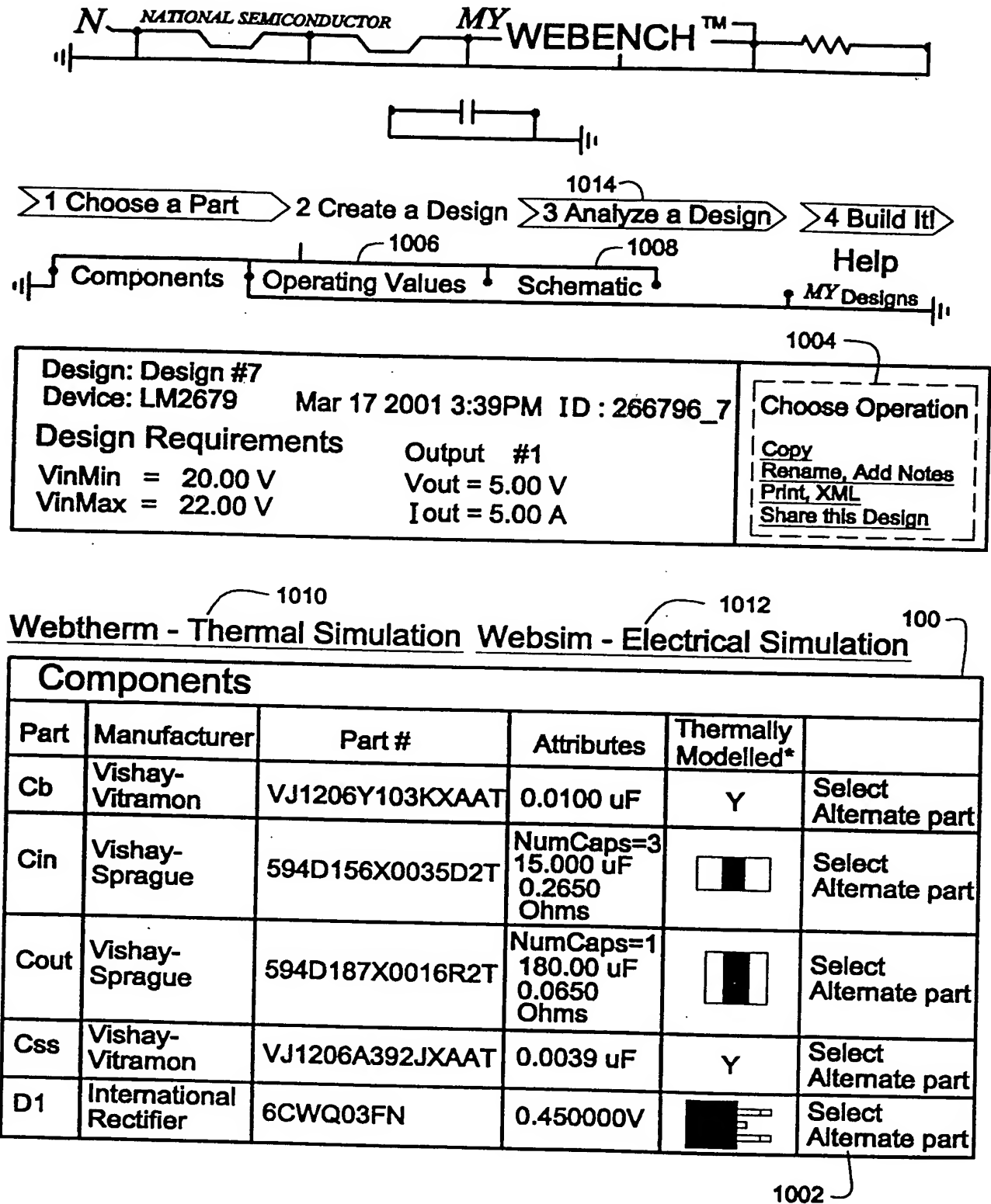




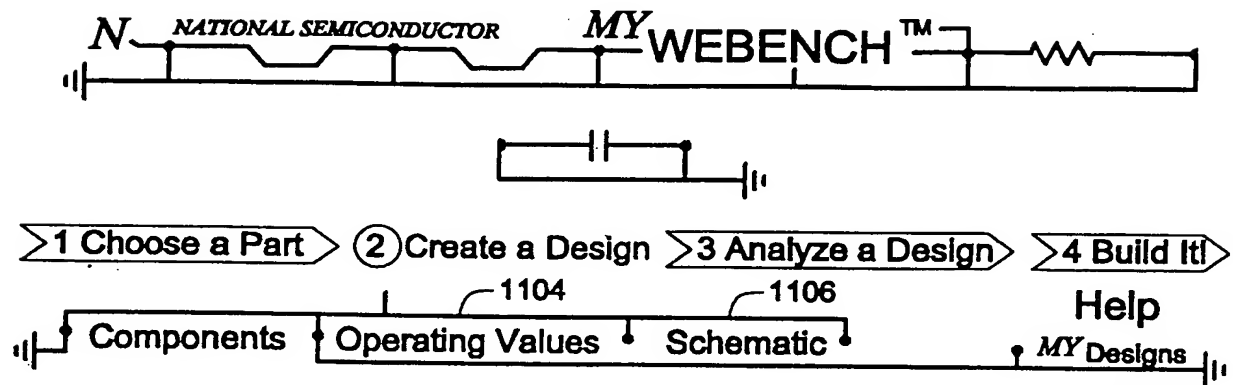
Figure 10A

IC	National Semi- conductor	<u>LM2679S-ADJ</u>	ADJV,Buck		Select Alternate part
L1	Coiltronics	UP4B-150	15.000 uH, 0.0200 Ohms		Select Alternate part
Rfb1	Vishay-Dale	CRCW1206- 1001FRT1	1000 Ohms	Y	Select Alternate part
Rfb2	Vishay-Dale	CRCW1206- 3161FRT1	3160 Ohms	Y	Select Alternate part
Rilim	Vishay-Dale	CRCW1206- 4991FRT1	4990 Ohms	Y	Select Alternate part

* Components marked "Y" are not required for Thermal Simulation.



Figure 10B



Design: Design #7
Device: LM2679 Mar 17 2001 3:39PM ID: 266796_7
Design Requirements Output #1
VinMin = 20.00 V Vout = 5.00 V
VinMax = 22.00 V Iout = 5.00 A

Select Alternate for Component D1								
Please select from the list of available alternates below. Click on the " Update BOM " button when you are done.								
				1108			Update - BOM	1102
Alternates	Part # Manufacturer	Thermally Modelled	Forward Voltage Drop	Max Rated Current	Max Voltage Rating	x,y,z in mm	Price	Quantity Available
Custom <input type="radio"/>	<input type="text"/> <input type="text"/>	N	Limit = 0.00 <input type="text"/> V	1110 Limit >= 5.00	1112 Limit >= 28.4			
1 <input type="radio"/>	6CWQ03FN International Rectifier		0.45000V	7.000A	30.00V	10.42 6.73 2.38	\$0.85	>10 in stock
2 <input type="radio"/>	50WQ03FN International Rectifier		0.46000V	5.500A	30.00V	10.42 6.73 2.38	\$1.83	>10 in stock
3 <input type="radio"/>	12CWQ03- FNTRL International Rectifier		0.47000V	12.00A	30.00V	10.42 6.73 2.38	\$0.82	>10 in stock
4 <input type="radio"/>	50WQ04FN International Rectifier		0.51000V	5.500A	40.00V	10.42 6.73 2.38	\$1.33	>10 in stock

Figure 11A

REPLACEMENT SHEET






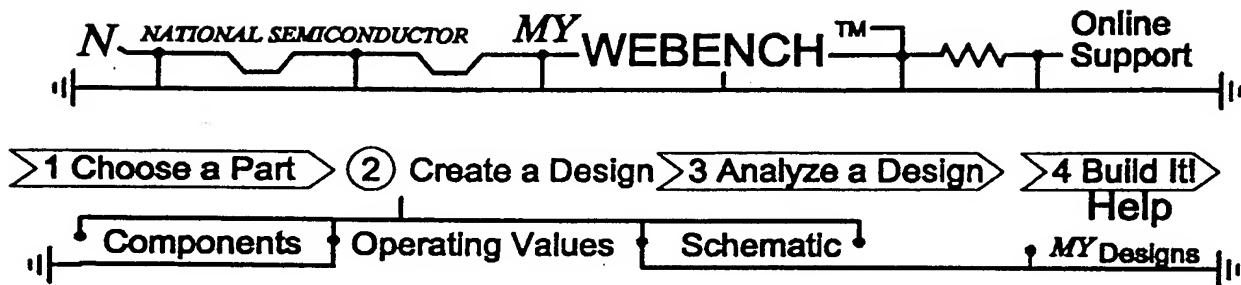
5 ○	<u>12CWQ04FN</u> <u>International</u> <u>Rectifier</u>		0.52000V	12.00A	40.00V	10.42 6.73 2.38	\$1.48	>10 in stock
6 ○	<u>6CWQ04FN</u> <u>International</u> <u>Rectifier</u>		0.53000V	7.000A	40.00V	10.42 6.73 2.38	\$1.00	>10 in stock
7 ○	<u>50WQ06FN</u> <u>International</u> <u>Rectifier</u>		0.57000V	5.500A	60.00V	10.42 6.73 2.38	\$1.07	>10 in stock
8 ○	<u>12CWQ06FN</u> <u>International</u> <u>Rectifier</u>		0.61000V	12.00A	60.00V	10.42 6.73 2.38	\$0.72	>10 in stock
9 ○	<u>6CWQ06-</u> <u>FNTR</u> <u>International</u> <u>Rectifier</u>		0.61000V	7.000A	60.00V	10.42 6.73 2.38	\$1.08	>10 in stock

Figure 11B



Design: Design #7	Mar 17 2001	ID: 266796_7	Choose Operation
Device: LM2679	3:39:00:000PM		
Design Requirements			Copy Rename, Add Notes Print, XML Share this Design
VinMin = 20.00 V	Output #1	Vout = 5.00 V	
VinMax = 22.00 V	Iout = 5.00 A		

Vin: V I out A

Operating Values			
#	Description	Parameter	Value
1	Pulse Width Modulation (PWM) Frequency	Frequency	260 kHz
2	Continuous or Discontinuous Conduction Mode, inductor current goes to zero in Discontinuous Conduction	Mode	Cont
3	Total Output Power	Pout	25.0W
4	Vin operating point	Vin Op	22.00V
5	Iout operating point	Iout Op	5.00A

Operating Point at Vin = 22.00 V, 5.00 A			
#	Description	Parameter	Value
1	Bode Plot Crossover Frequency, indication of bandwidth of supply	Cross Freq	97.7 kHz
2	Steady State PWM Duty Cycle, range limits from 0 to 100	Duty Cycle	25.8%
3	Steady State Efficiency	Efficiency	85.3%
4	IC Junction Temperature	IC Tj	120 °C
5	IC Junction to Ambient Thermal Resistance	ICThetaJA	34.9 °C/W
6	Bode Plot Phase Margin	Phase Marg	71.0 Deg
7	Peak-to-peak ripple voltage	Vout p-p	0.07 V

Figure 12A

Current Analysis			
#	Description	Parameter	Value
1	Input Capacitor RMS ripple current	Cin IRMS	2.2 A
2	Output Capacitor RMS ripple current	Cout IRMS	0.20 A
3	Peak Current in IC for Steady State Operating Point	IC Ipk	5.5 A
4	ICs Maximum rated peak current	IC Ipk Max	7.4 A
5	Average input current	IIn Avg	2.3 A
6	Inductor ripple current, peak-to-peak Value	L Ipp	1.1 A

Power Dissipation Analysis			
#	Description	Parameter	Value
1	Input Capacitor Power Dissipation	Cin Pd	0.43 W
2	Output Capacitor Power Dissipation	Cout Pd	0.0026 W
3	Diode Power Dissipation	Diode Pd	1.9 W
4	IC Power Dissipation	IC Pd	1.4 W
5	Inductor Power Dissipation	L Pd	0.50 W



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Figure 12B

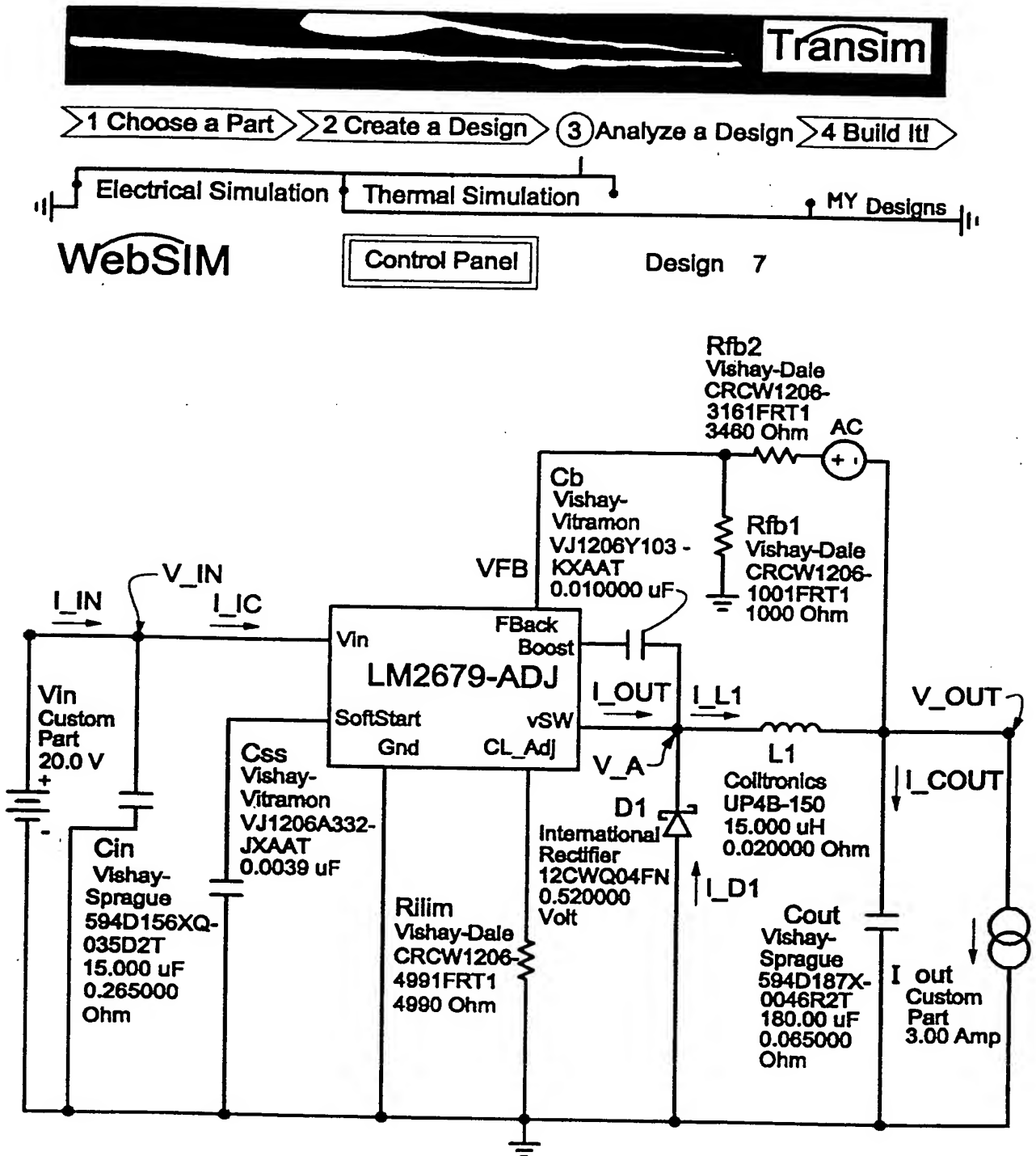


Figure 13

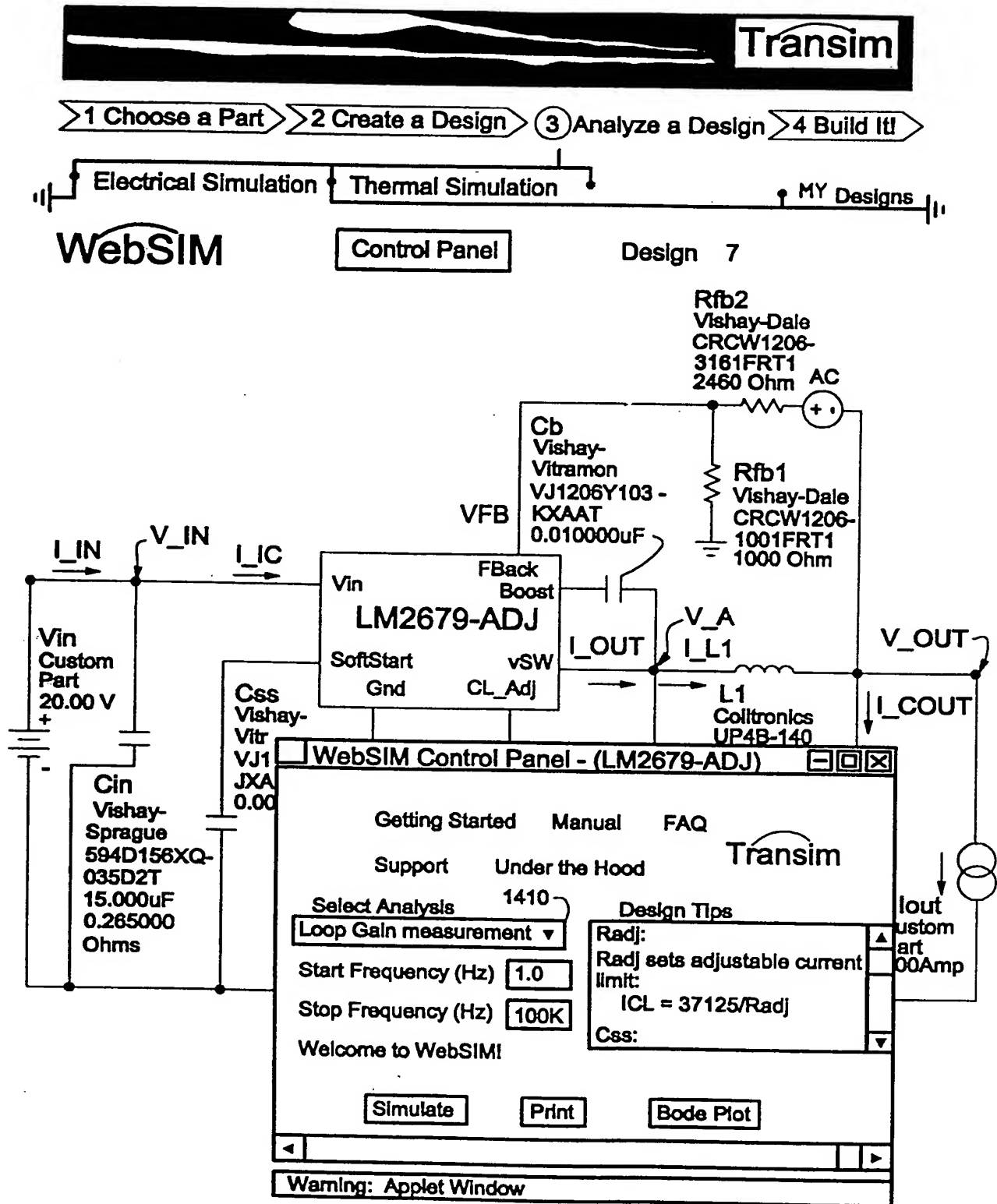
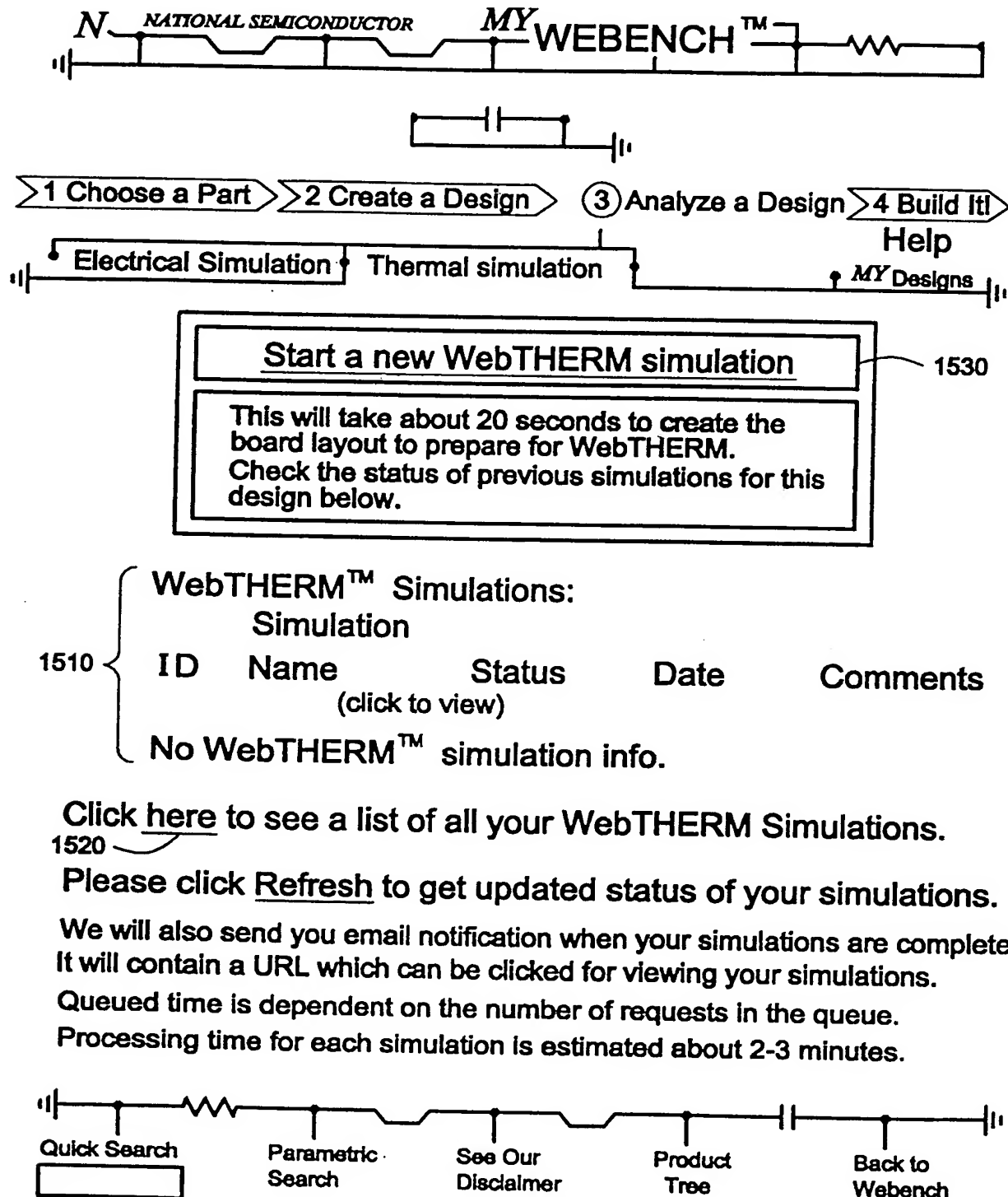



Figure 14



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Figure 15

REPLACEMENT SHEET



Online Support

> 1 Choose a Part
> 2 Create a Design
③ Analyze a Design
> 4 Build It!

Electrical Simulation
Thermal Simulation
Help

Design: Design #7
Device: LM2679
Mar 17 2001 3:39:00:000PM
ID: 266796_7

Design Requirements

VinMin = 20.00 V

VinMax = 22.00 V

Output #1

Vout = 5.00 V

Iout = 5.00 A

WebTHERM™
Powered by: **FLOMERICS**

When you have entered all your data, click here:

SUBMIT for new simulation

1670

Simulation ID : 4

Name This Simulation: 1660

Simulation for Design 7

Comments: 1665

▲

▼

Environment:

Operating Conditions

Vin: 22.00 V I out 5.00 A

Ambient Temperature

On Bottom: 30 °C On Top: 30 °C

Board Conditions

Copper Weight 1 OZ. (0.03556 mm) 1680

Board Orientation:

Component Side Up ▼

Air Flow

Direction: Velocity:

Edge Temperatures:

☒ Edge 1 Insulated OR 1630

N/A

 °C

☒ Edge 2 Insulated OR 1635

N/A

 °C

☒ Edge 3 Insulated OR 1640

N/A

 °C

☒ Edge 4 Insulated OR 1645

N/A

 °C

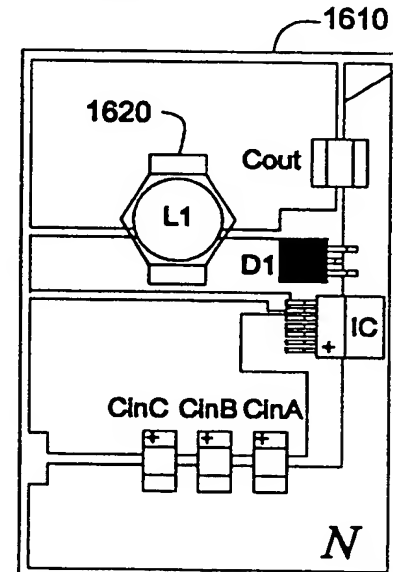
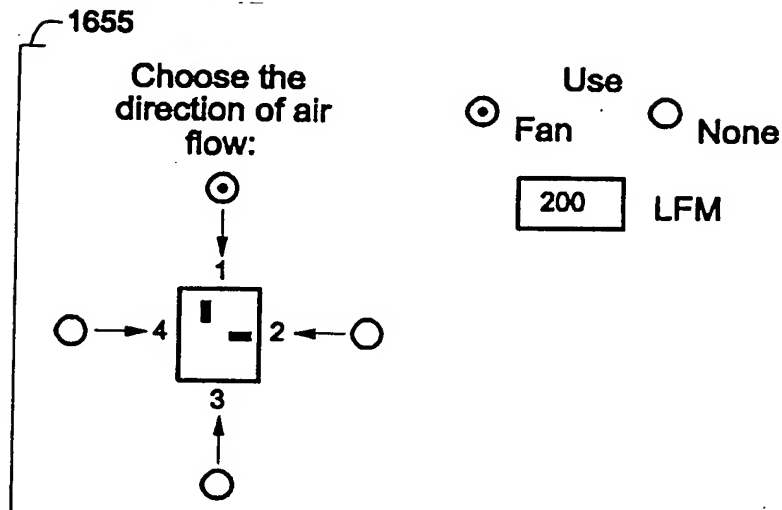


Figure 16A

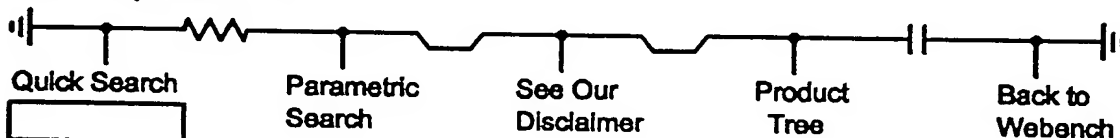
REPLACEMENT SHEET



BOM			
Component	Power Dissipation	Manufacturer	Part#
Cin	0.43 W	Vishay-Sprague	594D156X0035D2T
Cout	0.0026 W	Vishay-Sprague	594D187X0016R2T
D1	1.9 W	International Rectifier	12CWQ04FN
IC	1.4 W	National Semiconductor	LM2679
L1	0.50 W	Coiltronics	UP4B-150

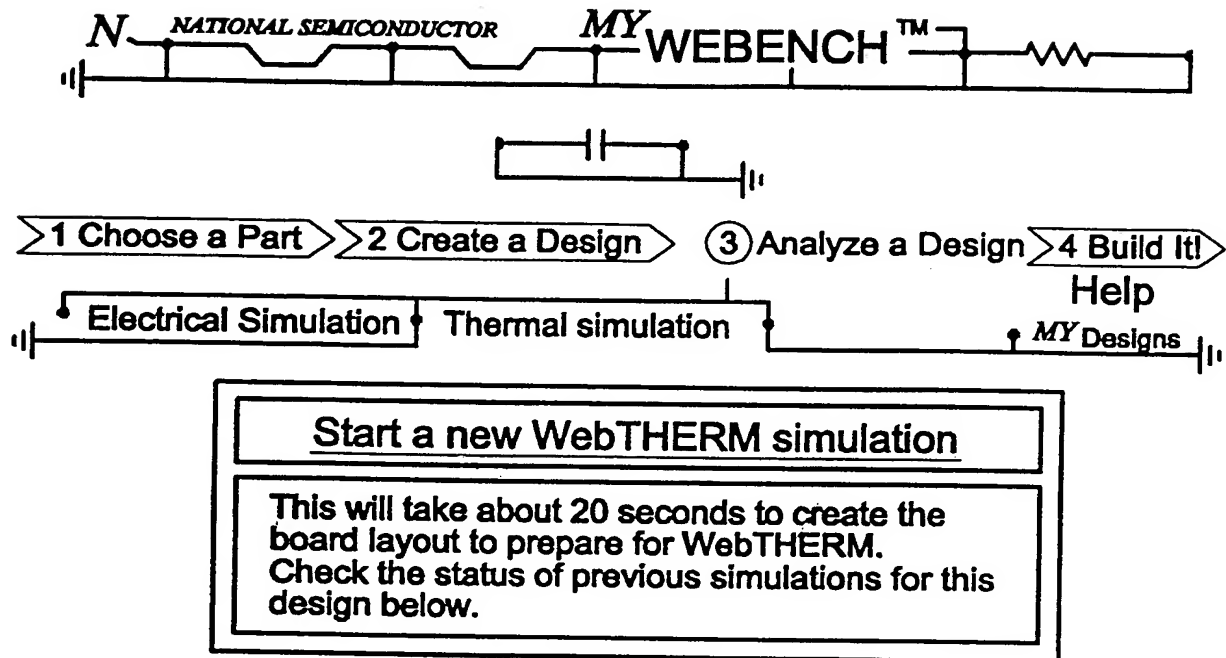
Design Assistant Messages

All components fit!



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Figure 16B



WebTHERM™ Simulations :

ID	Name	Status	Date	Comments
	(click to view)			
7 = Design ID	Simulations for Design ID : 7			Design ID : 7
1	Simulation for Design 7	queued	Mar 17 2001 5 : 05 : 45 PM.	

Please click [Refresh](#) to get updated status of your simulations.

We will also send you email notification when your simulations are complete. It will contain a URL which can be clicked for viewing your simulations.

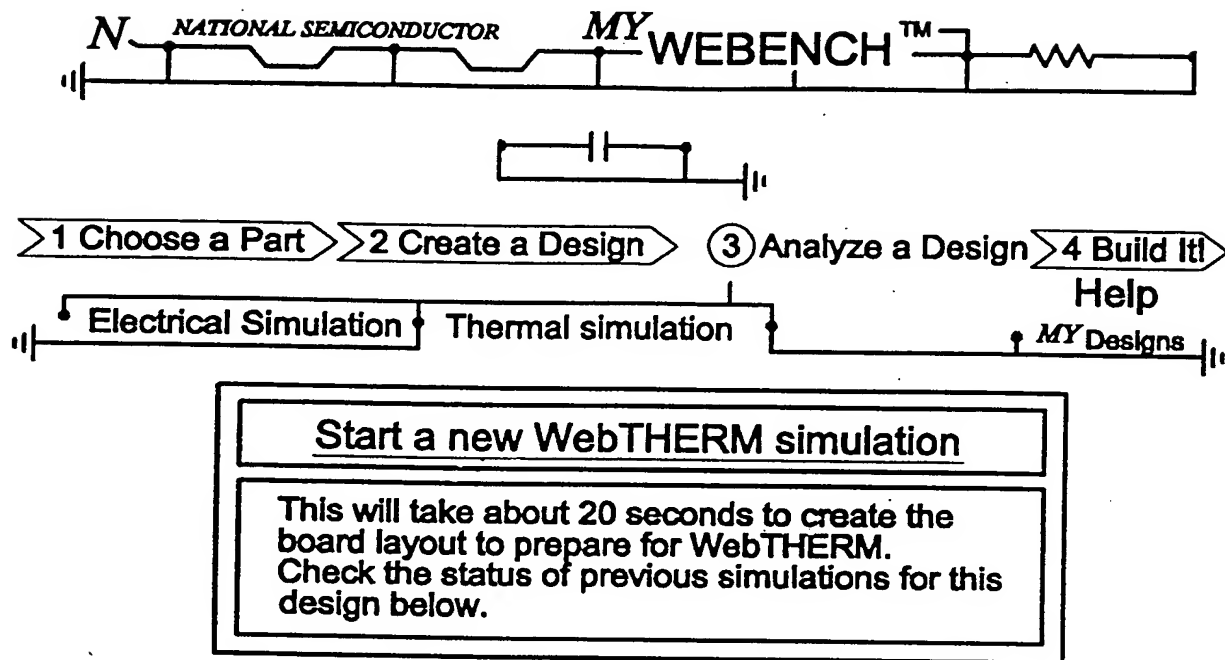
Queued time is dependent on the number of requests in the queue.

Processing time for each simulation is estimated about 2-3 minutes.



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Figure 17



WebTHERM™ Simulations :

ID	Name	Status	Date	Comments
	(click to view)			
7 = Design ID	Simulations for Design I D : 7			Design ID : 7
1	Simulation for Design 7	Processing	Mar 17 2001 5 : 05 : 57 PM	

1710

Please click Refresh to get updated status of your simulations.

We will also send you email notification when your simulations are complete. It will contain a URL which can be clicked for viewing your simulations.

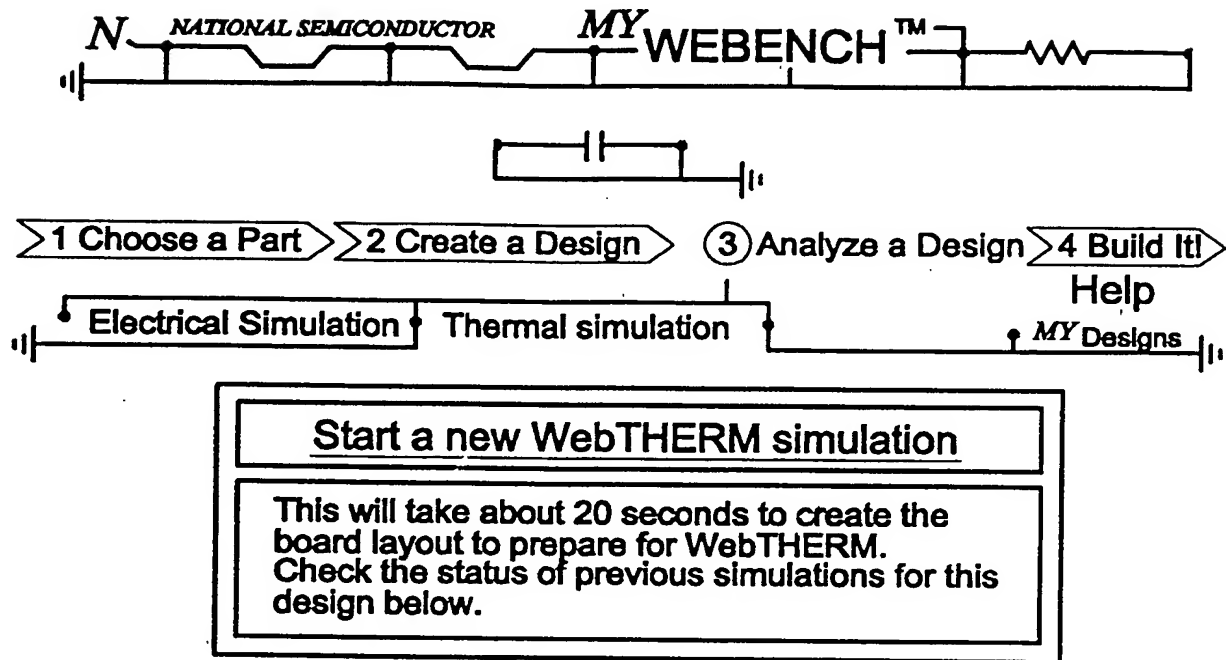
Queued time is dependent on the number of requests in the queue.

Processing time for each simulation is estimated about 2-3 minutes.



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Figure 18



WebTHERM™ Simulations :

ID	Name	Status	Date	Comments
	(click to view)			
7 = Design ID	Simulations for Design	D : 7	Design ID : 7	
1	<u>Simulation for</u> <u>Design 7</u>	<u>Completed</u>	Mar 17 2001 5 : 10 : 22 PM	

Please click Refresh to get updated status of your simulations.

We will also send you email notification when your simulations are complete. It will contain a URL which can be clicked for viewing your simulations.

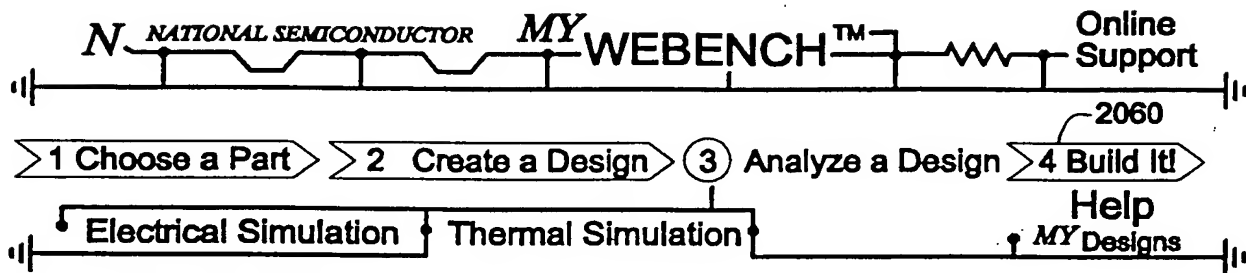
Queued time is dependent on the number of requests in the queue.

Processing time for each simulation is estimated about 2-3 minutes.



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Figure 19



Design: Design #7

Device: LM2679

Mar 17 2001 3:39:00:000PM

ID: 266796_7

Design Requirements

Output #1

VinMin = 20.00 V

Vout = 5.00 V

VinMax = 22.00 V

Iout = 5.00 A

WebTHERM™

Powered by: [Download Flomerics SMARTPART™](#)
FLOMERICS model

Simulation ID : 1
Name This
Simulation:
Simulation for
Design 7

[Do another simulation](#)

Edge Temperatures:

Environment:

Operating
Conditions

Vin: 22.00 V

Iout: 5.00A

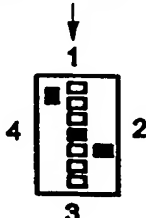
Ambient
Temperature
On

Bottom: 30 °C On Top:
30 °C

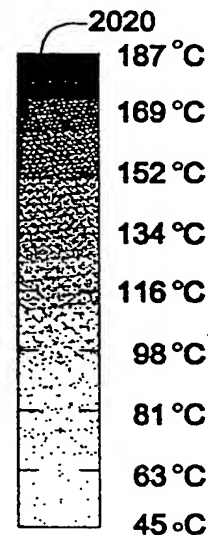
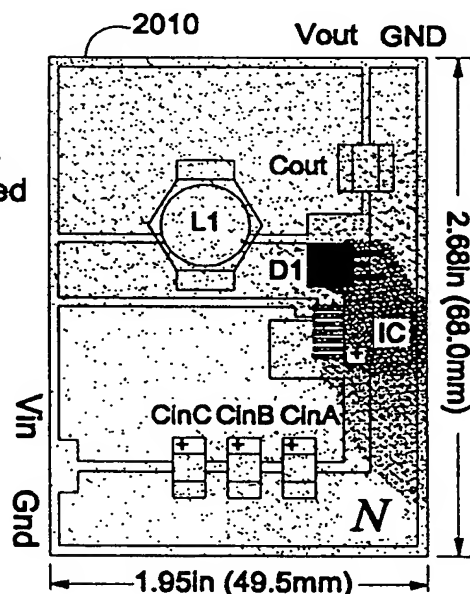
Board Conditions
Copper Weight
0.5 OZ. (0.01778 mm)

Board Orientation
Component Side Up

Air Flow
Direction Velocity:
of Air
flow: No Fan



Edge 4
Insulated



Edge 2
Insulated

Edge 3
Insulated

Temperature Bar Scaling
Click [here](#) to recolor your thermal image.

Max Colorbar Temperature 188 °C

Min Colorbar Temperature 48 °C

2040

Figure 20A

2030

Operating Temperatures				
Layer	Max Temp.	Manufacturer	Part #	Warnings
Cin	82 °C	Vishay-Sprague	594D156X0035D2T	
Cout	92 °C	Vishay-Sprague	594D187X0016R2T	
D1 - Diode	188 °C	International Rectifier	12CWQ04FN	
IC - Die	174 °C	National Semiconductor	LM2679	There is some potential problem with this design
IC - Top	165 °C			
L1 - Inductor	82 °C	Coiltronics	UP4B-150	
PCB	182 °C			

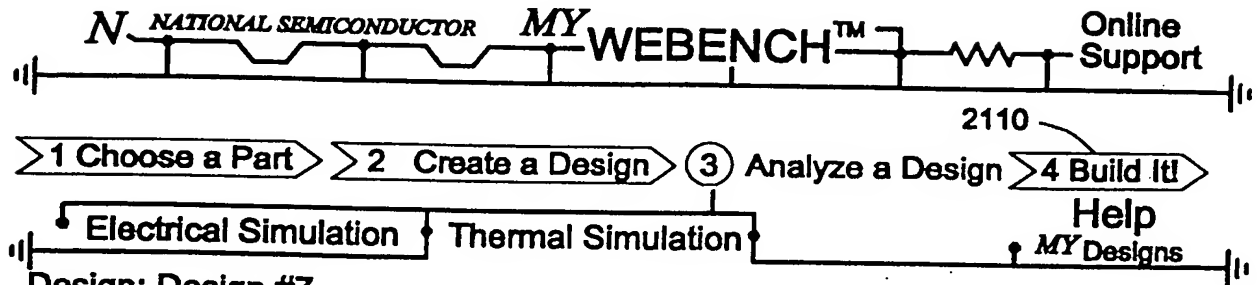
Design Assistant Messages

All components fit!



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Figure 20B



Design: Design #7

Device: LM2679

Mar 17 2001 3:39:00:000PM

ID: 266796_7

Design Requirements

Output #1

VinMin = 20.00 V

Vout = 5.00 V

VinMax = 22.00 V

Iout = 5.00 A

WebTHERM™

Powered by: [Download Flomerics SMARTPART™ model](#)
FLOMERICS

Simulation ID : 3
Name This
Simulation:
Simulation for
Design 7

[Do another simulation](#)

Edge Temperatures:

Edge 1
Insulated

Environment:

Operating
Conditions

Vin: 22.00 V

Iout: 5.00A

Ambient
Temperature

On

Bottom: 30 °C On Top: 30 °C

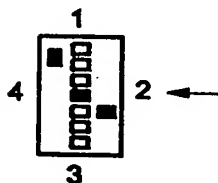
Board Conditions

Copper Weight
0.5 OZ. (0.01778 mm)

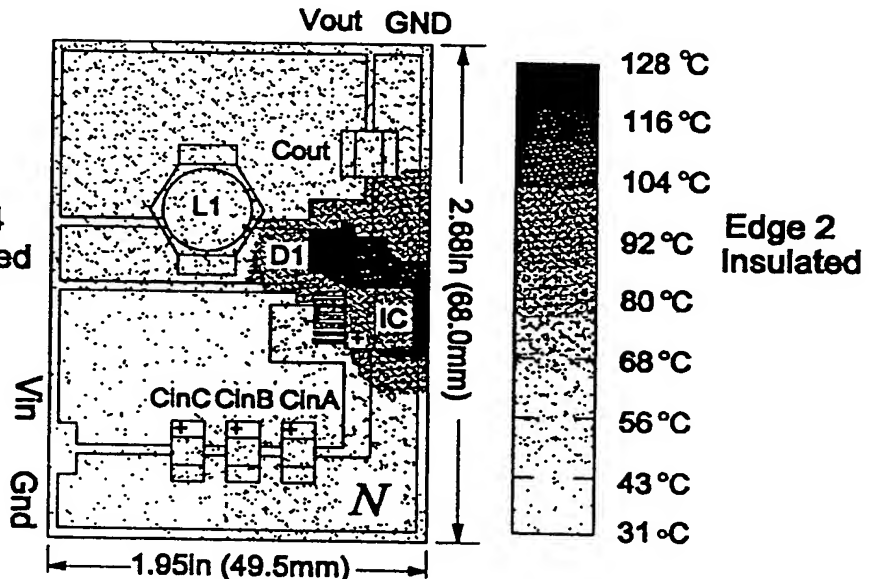
Board Orientation:

Component Side Up

Air Flow
Direction Velocity:
of Air
flow: 400LFM



Edge 4
Insulated



Edge 3
Insulated

Temperature Bar Scaling

[Click here to recolor your thermal image.](#)

Max Colorbar Temperature 128 °C

Min Colorbar Temperature 32 °C

Figure 21A

Operating Temperatures				
Layer	Max Temp.	Manufacturer	Part #	Warnings
Cin	50 °C	Vishay-Sprague	594D156X0035D2T	
Cout	50 °C	Vishay-Sprague	594D187X0016R2T	
D1 - Diode	128 °C	International Rectifier	12CWQ04FN	
IC - Die	112 °C	National Semiconductor	LM2679	There is some potential problem with this design.
IC - Top	97 °C			
L1 - Inductor	46 °C	Coiltronics	UP4B-150	
PCB	123 °C			

Design Assistant Messages

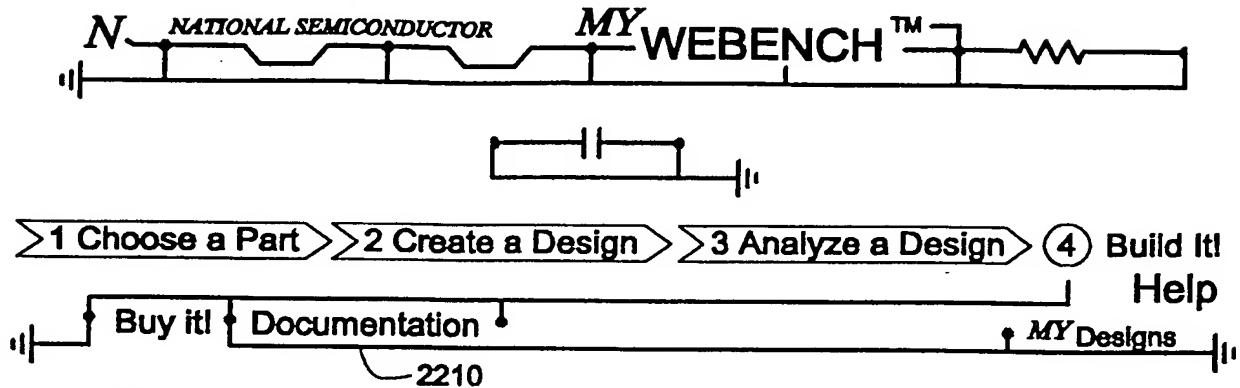
All components fit



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Figure 21B

REPLACEMENT SHEET



Design : 7

Your design is supported by a Webench Custom Evaluation Kit. Ordering this kit from Pioneer-Standard provides you with everything you need to realize a prototype of your design quickly and at a very low price.

If for some reason you decide not to order the Custom Evaluation Kit you can always order only the IC from us here.

Custom Evaluation Kit

Bill of

Materials

2220

2230

[View Assembly Doc](#)

[Order this Kit from Pioneer-Standard >>](#)











Item	Manufacturer Part	Qty	Attributes	Component Name(s)	Pioneer Price	Pioneer Availability
1	International Rectifier 12CWQ04FN 	1	VF _{ratio} = 0.52 V	D1	\$1.48	> 10 in Stock
2	Keystone 5015	4		TP1, TP2, TP3, TP6	\$0.20	> 10 in Stock
3	National Semiconductor 551011367-011	1	Surface Mount, etc	PC Board	\$5.00	> 10 in Stock
4	Vishay-Sprague 594D156X0035D2T 	3	Cap=15uF ESR= 0.265 Ohms	Cin	\$1.00	> 10 in Stock
5	Vishay-Sprague 594D187X0016R2T 	1	Cap=180uF ESR= 0.065 Ohms	Cout	\$1.00	> 10 in Stock

Figure 22A

REPLACEMENT SHEET

6	Vishay-Dale CRCW1206- 1001FRT1 	1	Resistance =1000 Ohms	Rfb1	\$0.03	> 10 in Stock
7	Vishay-Dale CRCW1206- 3161FRT1 	1	Resistance =3160 Ohms	Rfb2	\$0.03	> 10 in Stock
8	Vishay-Dale CRCW1206- 4991FRT1 	1	Resistance =4990 Ohms	Rilim	\$0.03	> 10 in Stock
9	National Semiconductor LM2679S-ADJ	1	Package=S, Voltage option=ADJ, Topology= Buck	IC	\$4.75	> 10 in Stock
10	Coiltronics UP4B-150 	1	L = 15uH DCR = 0.02 Ohms	L1	\$1.50	> 10 in Stock
11	Vishay-Vitramon  VJ1206A392JXAAT	1	Cap = 0.0039uF	Css	\$0.05	> 10 in Stock
12	Vishay-Vitramon  VJ1206Y103KXAAT	1	Cap = 0.01uF	Cb	\$0.05	> 10 in Stock
13	Vishay-Vitramon  VJ1206Y104KXAAT	1		Cinx	\$0.05	> 10 in Stock
				Total	\$17.77	

Bill of
Materials

[View Assembly Doc](#)

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Order the IC

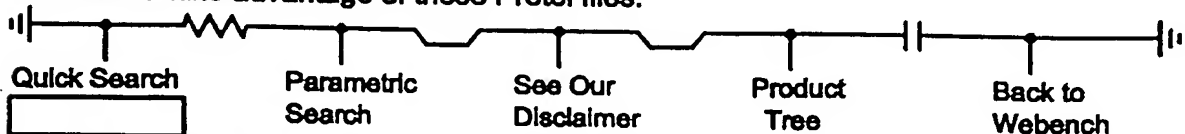
- [Order the LM2679S-ADJ in volume](#)
- [Order a Free Sample](#)

Generic Eval Board for LM2679

- [Buy Eval Board for LM2679](#)
- [Download Protel File \(See Notes Below\)](#)

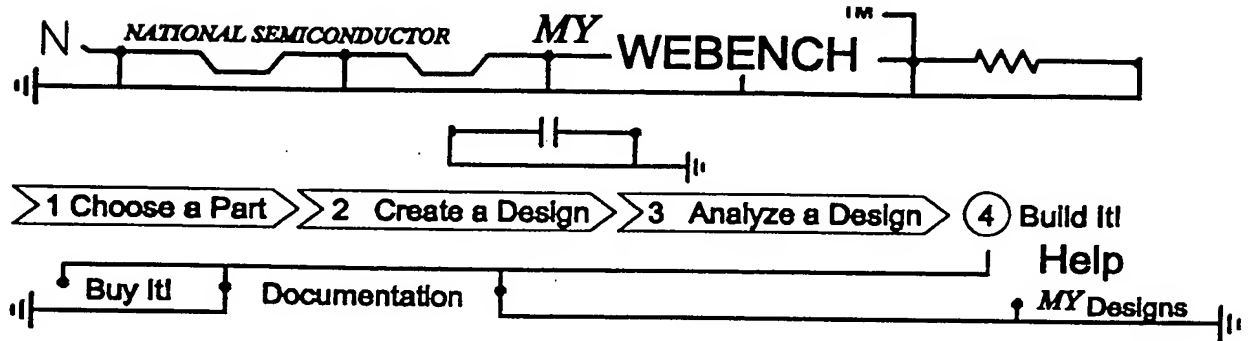
The Protel files are saved as Self Extracting Zip Archives. To download a product's Protel file, click on the corresponding "Protel file now" link, and save the link as a file on your computer. Then run the file on your computer (double click). This will automatically decompress the Protel file to your computer's disk.

Note: You must have Protel software or other software that can read Protel PCB layout files in order to take advantage of these Protel files.



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Figure 22B



Assembly Document for Your LM2679 Design # : 7
LM2679 SMD Evaluation Board (LM2679BU1PWB)

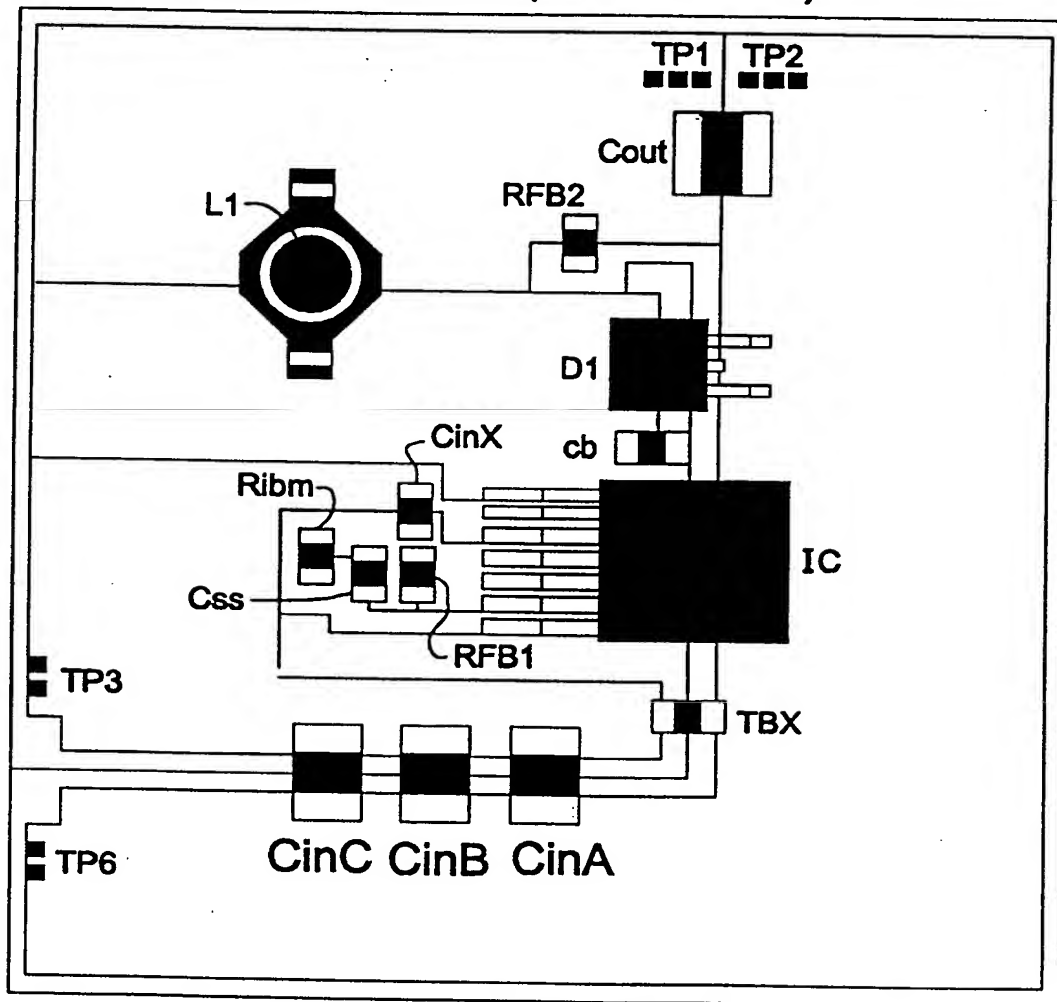


FIGURE 1 - Assembly Diagram

[Download the Board Layout in Protel format.](#)

GENERAL DESCRIPTION

Figure 23A

REPLACEMENT SHEET

The LM2679 SMD Evaluation Board is designed to provide a flexible PCB platform for customers to develop and test custom power supply designs using tools available on the POWER.NATIONAL.COM website. The LM2679BU1PWB is a single sided surface mount layout using 1 oz copper. The overall board dimensions are 2.475" x 2.700". All components are mounted on the topside copper. WEBENCH™ has automatically placed the components on this board to make sure that the input capacitor Cin (and Cinx) and the diode D1 are as close to the IC as is reasonable minimizing stray circuit inductance. L1 and Cout should also be as close to the IC as reasonable but mostly to minimize the overall dimensions of the required PCB area for the power supply.

The LM2679 SMD Evaluation Board consists of a single layer PCB layout providing major landing areas on the PCB for the power conversion components: Inductor, Diode, Input and Output Capacitors as well as parameter setting small signal passive (resistors and capacitors) in 1206 packages and surface mount test points. Some components are optional or specific to an application, these are highlighted in the schematic. The PCB layout can be optimized for a specific design and lends itself to be dimensionally scalable (i.e. your particular design may have unused board area that can be "cut out" in the final application. This topic is covered in the PCB Layout Optimization section.

Bill of Materials (BOM).











Item	Manufacturer Part	Qty	Attributes	Component Name(s)
1	International Rectifier 12CWQ04FN 	1	VF _{ratio} = 0.52 V	D1
2	Keystone 5015	4		TP1, TP2, TP3, TP6
3	National Semiconductor 551011367-011	1	Surface mount, etc	PC Board
4	Vishay-Sprague 594D156X0035D2T 	3	Cap=15uF ESR=0.265 Ohms	Cin
5	Vishay-Sprague 594D187X0016R2T 	1	Cap=180uF ESR=0.065 Ohms	Cout

Figure 23B

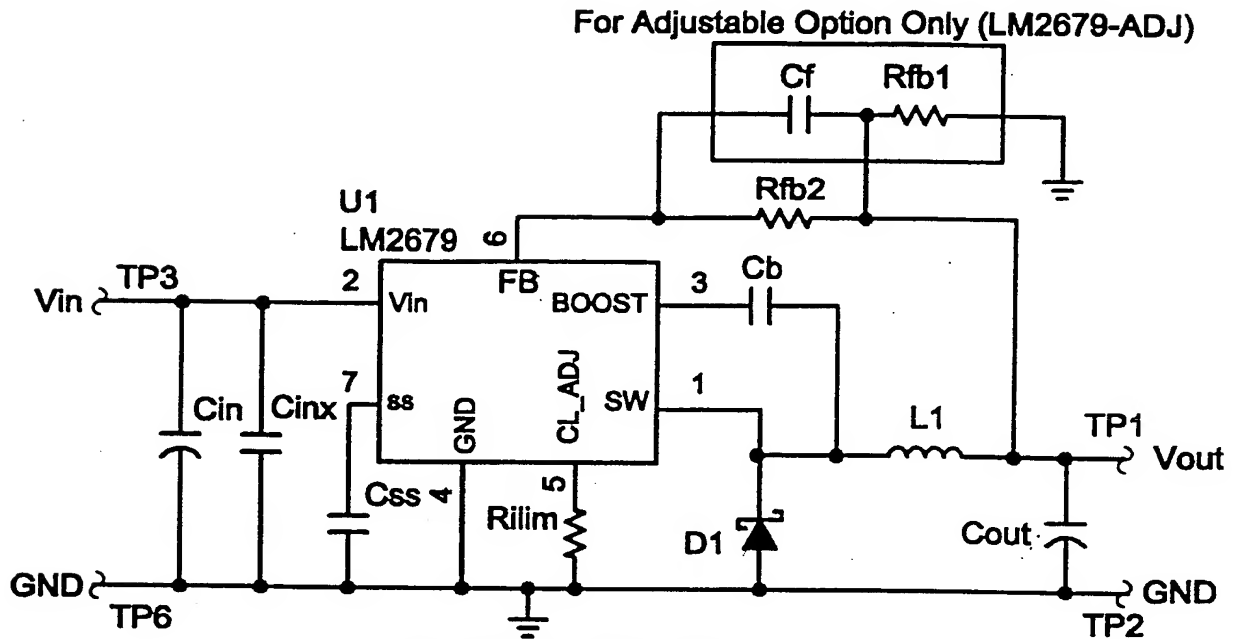
REPLACEMENT SHEET

6	Vishay-Dale CRCW1206-1001FRT1 	1	Resistance = 1000 Ohms	Rfb1
7	Vishay-Dale CRCW1206-3161FRT1 	1	Resistance = 3160 Ohms	Rfb2
8	Vishay-Dale CRCW1206-4991FRT1 	1	Resistance = 4990 Ohms	Rilim
9	National Semiconductor LM2679S-ADJ	1	Package=S, Voltage option=ADJ Topology=Buck	IC
10	Coiltronics UP4B-150 	1	L = 15uH DCR = 0.02 Ohms	L1
11	Vishay-Vitramon VJ1206A392JXAAT 	1	Cap = 0.0039uF	Css
12	Vishay-Vitramon VJ1206Y103KXAAT 	1	Cap = 0.01uF	Cb
13	Vishay-Vitramon VJ1206Y104KXAAT 	1		Cinx

SCHEMATIC

The Schematic for the LM2679 is shown in FIGURE 2. U1, L1, D1, Cin and Cout are the basic power conversion components. Cinx as a high frequency bypass to the input to the LM2679. Rfb1, Rfb2, and Cf form the feedback network for the adjustable version of the LM2679. For Fixed output versions a zero Ohm resistor (jumper) should be used for Rfb2 (Rfb1 and Cf should be left off the board), this can be replaced by a copper trace as shown in the PCB Layout Optimization section. A space is reserved for a pull-down resistor, Ron, for the ON/OFF (Active low) pin, this may be desired if a Tri-State gate is driving this pin. Otherwise, if the ON/OFF pin is left floating, the LM2679 is normally ON.

Figure 23C



Download the Schematic file in Protel format.

Component Testing

Some published data on components in datasheets such as Capacitor ESR and Inductor DC resistance is based on conservative values that will guarantee that the components always exceed the specification. For design purposes it is usually better to work with typical values. Since this data is not always available it is a good practice to measure the Capacitance and ESR values of C_{in} and C_{out} , and the inductance and DC resistance of $L1$ before assembly of the board. Any large discrepancies in values should be electrically simulated to check for instabilities and thermally simulated to make sure critical temperatures are not exceeded.

Soldering Components to the Board

If board assembly is done in house it is best to track down one terminal on the board then solder the other terminal. For the LM2679 the tab on the back of the TO-263 package should be pre-tinned with solder, then tacked into place by one of the pins. To solder the tab down to the board place the iron down on the board while resting against the tab, heating both surfaces simultaneously. Apply light pressure to the top of the plastic case until the solder flows around the part and the part is flush with the PCB. If the solder is not flowing around the board you may need a higher wattage iron (generally 25W to 30W is enough).

Testing

It is best to power up the board by setting the supply voltage to the lowest operating input voltage ($V_{in\ min}$) and set the supply's current limit to zero. With the supply off connect up the supply to V_{in} and GND. Connect a DVM to V_{out} and GND. Turn on the supply and slowly turn up the current limit. If the voltage starts to rise on the supply continue increasing the current while watching the output voltage. If the current increases on the supply but the voltage remains near zero there may be a short or a component misplaced on the board. Power down the board and visually inspect for solder bridges and recheck the diode and capacitor polarities. Once the supply is operational then more extensive testing may include full load testing, transient load and line tests to compare with simulation results.

Figure 23D

ARTWORK

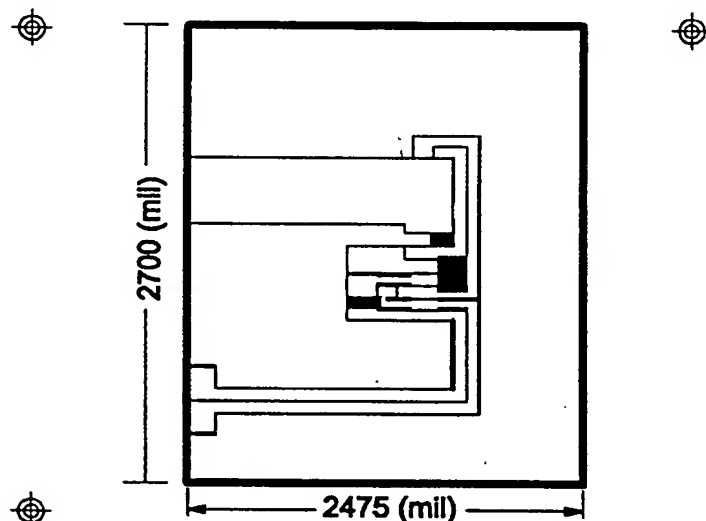
FIGURE 3 shows the topside copper and FIGURE 4 shows the bottom side copper.

The intent of this board is to provide a flexible PCB layout to allow many different designs to be implemented using the same layout. In lower power designs you may find unused board space, that is not needed for electrical or thermal purposes. The overall layout lends itself to shrinking the design by trimming off the outer edges of the board.

Download the GERBER file for this PC Board.

NOTES: UNLESS OTHERWISE SPECIFIED

1. NO FAB SHOP LOGO < DATE CODE REQUIRED
2. APPLY GREEN (LPI) SOLDERMASK ON BOTH SIDES
3. NO SILKSCREEN
4. ADD UL RATING ON BOTTOM SIDE
5. MATERIAL : FP - 1, GREEN
6. BOARD THICKNESS : 0.063 WITH 1 oz COPPER
7. FINISH : TIN - LEAD



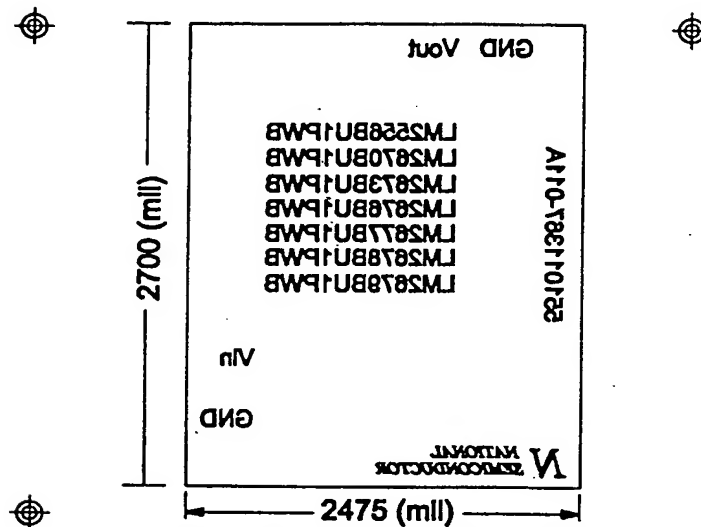
MECHANICAL LAYER 551011367-011A
TOP ETCH 551011367-011A

FIGURE 3 - Topside Cooper

NOTES: UNLESS OTHERWISE SPECIFIED

1. NO FAB SHOP LOGO < DATE CODE REQUIRED
2. APPLY GREEN (LPI) SOLDERMASK ON BOTH SIDES
3. NO SILKSCREEN
4. ADD UL RATING ON BOTTOM SIDE
5. MATERIAL : FP - 1, GREEN
6. BOARD THICKNESS: 0.063 WITH 1 oz COPPER
7. FINISH : TIN - LEAD

Figure 23E



MECHANICAL LAYER 551011367-011A

At 10-78E110123 HOTE MOTTOB

FIGURE 4 - Bottom Side Copper

Downloadable files

Schematic File

The Schematic File in Protel format.

Board Layout File

Board Layout in Protel format.

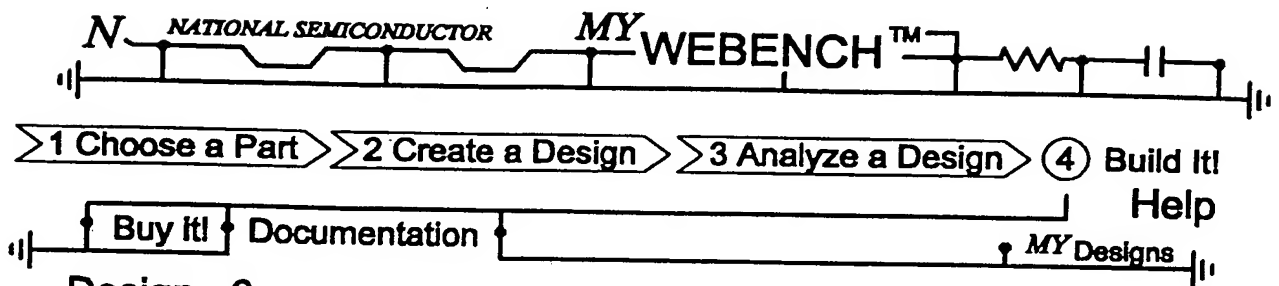
GERBER File

GERBER file for making the PC Board



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Figure 23F



Design : 6

WEBENCH Documentation

Assembly Doc.

The Webench Assembly Document describes in detail how to build your design. It contains the specific assembly diagram for your design, a complete bill of materials and other PC board images and assembly instructions.

Design Doc. — 2440

The WEBENCH Design Document provides a single web page describing your entire design including: design specifications, calculated values, WebSIM simulation results and WebTHERM simulation results.

LM2679 Folder — 2420

LM2679 Product Folder is full of documentation about the National IC used in your design.

My Orders

My Orders is a list of all of your on - line orders.

WEBENCH Downloads

You can download these files to integrate this design into your local CAD environment. These files are self-extracting zip files. For the files stored in Protel format you will need the Protel application or equivalent CAD software capable of opening such files.

Schematic File

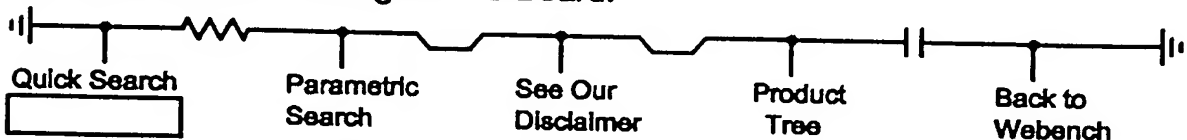
The Schematic File in Protel format.

Board Layout File

Board Layout in Protel format.

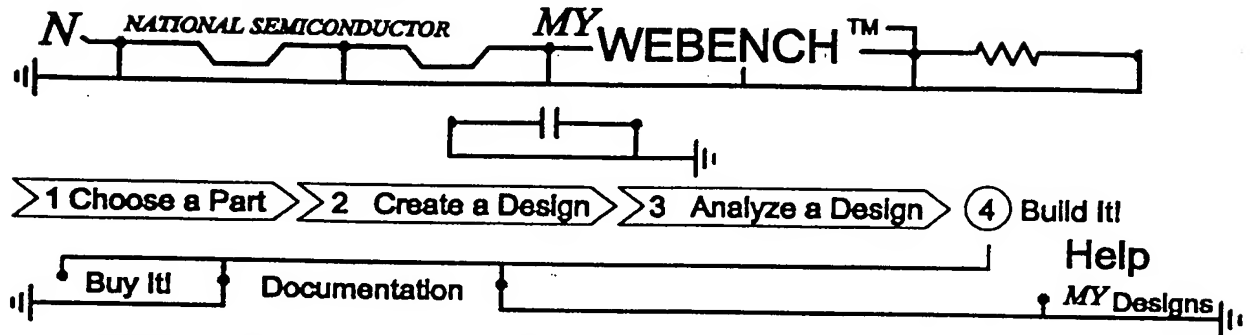
GERBER File

GERBER file for making the PC Board.



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Figure 24



Design Document For Your LM2679 Design # : 7

Table of Contents:

1. Introduction
2. Design Specifications
3. Schematic
4. Operating Values
5. The Selected IC
6. BOM - Bill of Materials
7. WebTHERM Results
8. Build It!
9. Appendices

Introduction

Custom power supply designs using tools are available on the POWER.NATIONAL.COM website.

Design Specifications

Design: Design #7

Device: LM2679

Mar 17 2001 3 : 39PM

ID: 266796_7

Design Requirements

Output #1

VinMin = 20.00 V

Vout = 5.00 V

VinMax = 22.00 V

Iout = 5.00 A

Schematic

Use WebSIM to display your schematic.

Operating Values

Figure 25A

REPLACEMENT SHEET

Operating Values			
#	Description	Parameter	Value
1	Pulse Width Modulation (PWM) Frequency	Frequency	260 kHz
2	Continuous or Discontinuous Conduction Mode, inductor current goes to zero in Discontinuous Conduction	Mode	Cont
3	Total Output Power	Pout	25.0 W

Operating Point at Vin = 22.00 V			
#	Description	Parameter	Value
1	Bode Plot Crossover Frequency, indication of bandwidth of supply	Cross Freq	97.7 kHz
2	Steady State PWM Duty Cycle, range limits from 0 to 100	Duty Cycle	25.8 %
3	Steady State Efficiency	Efficiency	85.3 %
4	IC Junction Temperature	IC TJ	120 °C
5	IC Junction to Ambient Thermal Resistance	ICThetaJA	34.9 °C/W
6	Bode Plot Phase Margin	Phase Marg	71.0 Deg
7	Peak-to-peak ripple voltage	Vout p-p	0.07 V

Current Analysis			
#	Description	Parameter	Value
1	Input Capacitor RMS ripple current	Cin IRMS	2.2 A
2	Output Capacitor RMS ripple current	Cout IRMS	0.20 A
3	Peak Current in IC for Steady State Operating Point	IC Ipk	5.5 A
4	ICs Maximum rated peak current	IC Ipk Max	7.4 A
5	Average Input current	Iin Avg	2.3 A
6	Inductor ripple current, peak-to-peak Value	L Ipp	1.1 A

Figure 25B

REPLACEMENT SHEET

Power Dissipation Analysis			
#	Description	Parameter	Value
1	Input Capacitor Power Dissipation	Cin Pd	0.43 W
2	Output Capacitor Power Dissipation	Cout Pd	0.0026 W
3	Diode Power Dissipation	Diode Pd	1.9 W
4	IC Power Dissipation	IC Pd	1.4 W
5	Inductor Power Dissipation	L Pd	0.50 W

LM2679 The Selected IC

NSID = LM2679S-ADJ

Topology = Buck

Package = S

BOM - Bill of Materials








Item	Manufacturer Part	Qty	Attributes	Component Name(s)
1	International Rectifier 12CWQ04FN 	1	VF _{ratio} = 0.52 V	D1
2	Keystone 5015	4		TP1, TP2, TP3, TP6
3	National Semiconductor 551011367-011	1	Surface Mount, etc	PC Board
4	Vishay-Sprague 594D156X0035D2T 	3	Cap=15uF ESR= 0.265 Ohms	Cin
5	Vishay-Sprague 594D187X0016R2T 	1	Cap=180uF ESR= 0.065 Ohms	Cout
6	Vishay-Dale CRCW1206- 1001FRT1 	1	Resistance =1000 Ohms	Rfb1
7	Vishay-Dale CRCW1206- 3161FRT1 	1	Resistance =3160 Ohms	Rfb2

Figure 25C

8	Vishay-Dale CRCW1206- 4991FRT1 	1	Resistance = 4990 Ohm	Rilim
9	National Semiconductor LM2679S-ADJ	1	Package=S, Voltage option = ADJ Topology = Buck	IC
10	Coiltronics UP4B-150 	1	L = 15uH DCR = 0.02 Ohm	L1
11	Vishay-Vitramon VJ1206A392JXAAT	1	Cap = 0.0039 uF	Css
12	Vishay-Vitramon VJ1206Y103KXAAT	1	Cap = 0.01 uF	Cb
13	Vishay-Vitramon VJ1206Y104KXAAT	1		Cinx

WebTHERM - Thermal Simulation Results

You have performed 3 WebTHERM thermal simulation(s) on this design.
Here are the results of the most recent one.

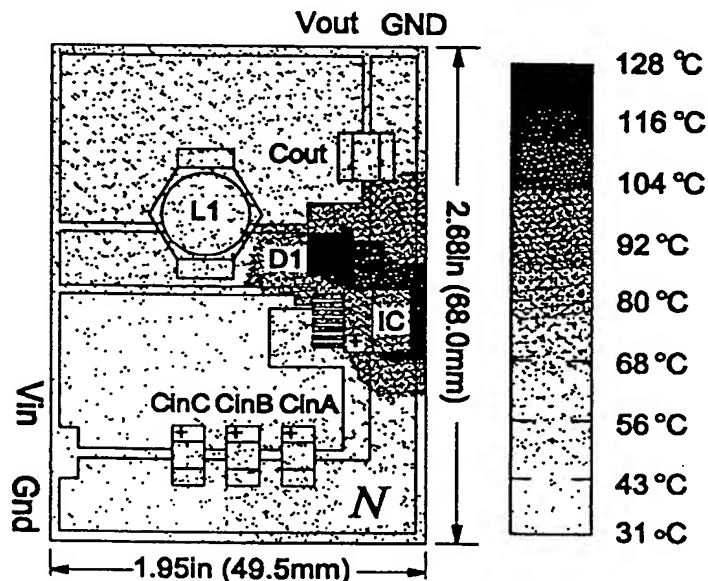


Figure 25D

Be sure to electrically simulate this design using webSIM.

Build It!

Webench provides both custom and generic evaluation boards to assist you in the building of prototypes of your design. Additionally, for some designs, it is possible to order the complete BOM (Bill of Materials) on-line using Webench.

A custom evaluation board is available for your design!

Webench provides a custom evaluation board which may be on-line ordered from Pioneer-Standard for designs like yours using National LM2679S-ADJ configured in the Buck topology.

Appendices

A. You have performed 3 thermal simulation(s) on this design.

ID	Simulation Name	Date
1	<u>Simulation for Design 7</u>	Mar 17 2001 5 : 10 PM
2	<u>Simulation for Design 7</u>	Mar 17 2001 5 : 19 PM
3	<u>Simulation for Design 7</u>	Mar 17 2001 5 : 23 PM

B. No electrical simulation(s) performed on this design.



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Figure 25E

REPLACEMENT SHEET



[Webench™
Designs]

[WebTHERM™
Simulations]

[WebSIM™
Simulations]

[BuildIt
Orders]

Tim Sullivan - You have 7 designs stored in your personal workspace

ID	Design Name	Device	Creation Date	Modification Date	Design Assistant	Comments	Design Operations
7	Design # 7	LM2679	Mar 17 2001 3 : 39PM	Mar 17 2001 3 : 57PM	Power		Modify, Analyze, Build, Add Notes, Delete, Share
6	Design # 6	LM2679	Mar 15 2001 3 : 23PM	Mar 15 2001 3 : 23PM	Power		Modify, Analyze, Build, Add Notes, Delete, Share
5	Design # 5	LM2679	Mar 15 2001 11 : 41AM	Mar 15 2001 11 : 44AM	Power		Modify, Analyze, Build, Add Notes, Delete, Share
4	Design # 4	LM2679	Mar 13 2001 9 : 52AM	Mar 13 2001 10 : 03AM	Power		Modify, Analyze, Build, Add Notes, Delete, Share
3	Design # 3	LM2679	Mar 13 2001 9 : 52AM		Power		Modify, Analyze, Build, Add Notes, Delete, Share
2	Design # 2	LM2678	Mar 13 2001 9 : 50AM		Power		Modify, Analyze, Build, Add Notes, Delete, Share
1	Design # 1	LM2678	Mar 13 2001 9 : 50AM		Power		Modify, Analyze, Build, Add Notes, Delete, Share



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Figure 26

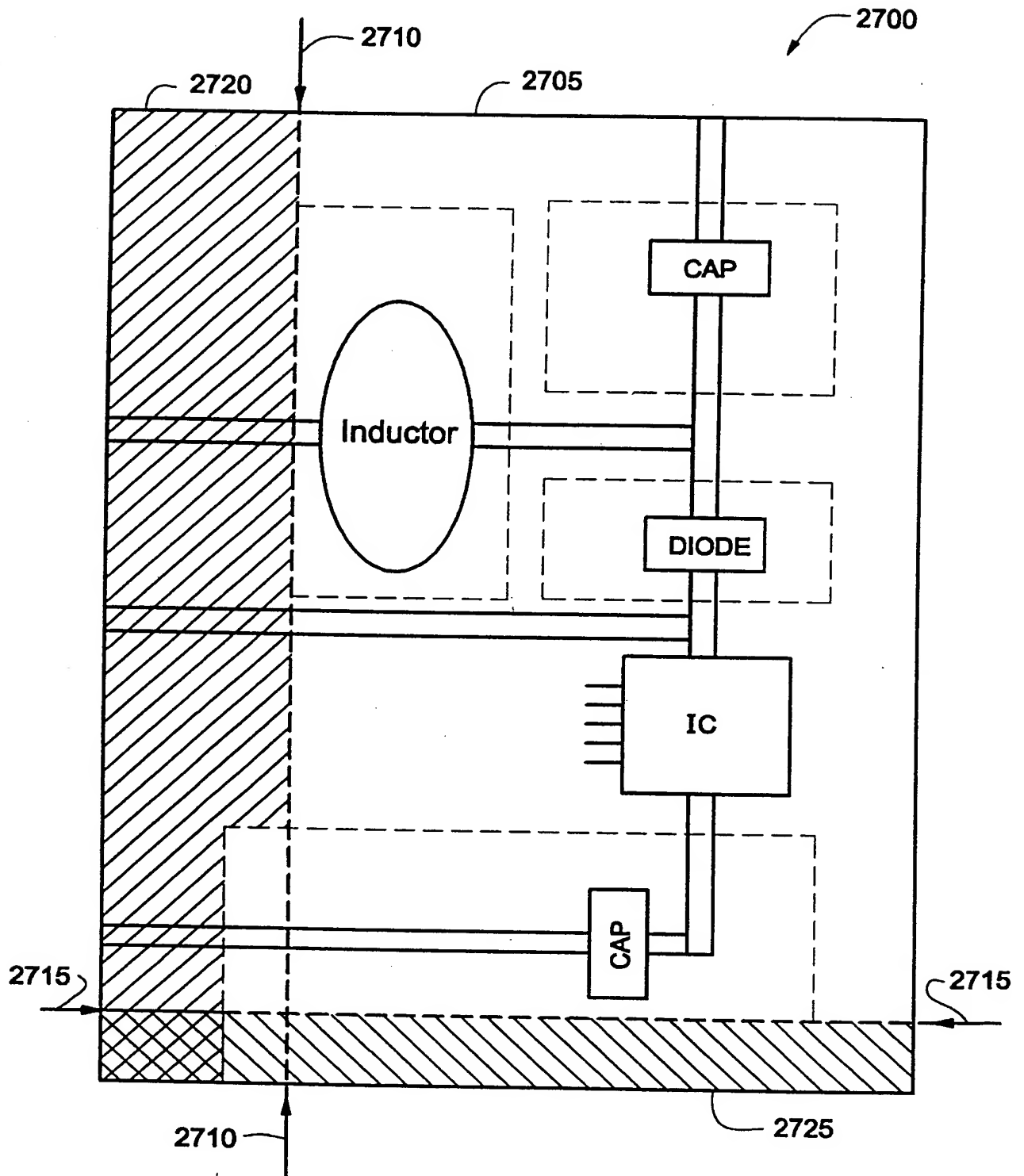


Figure 27

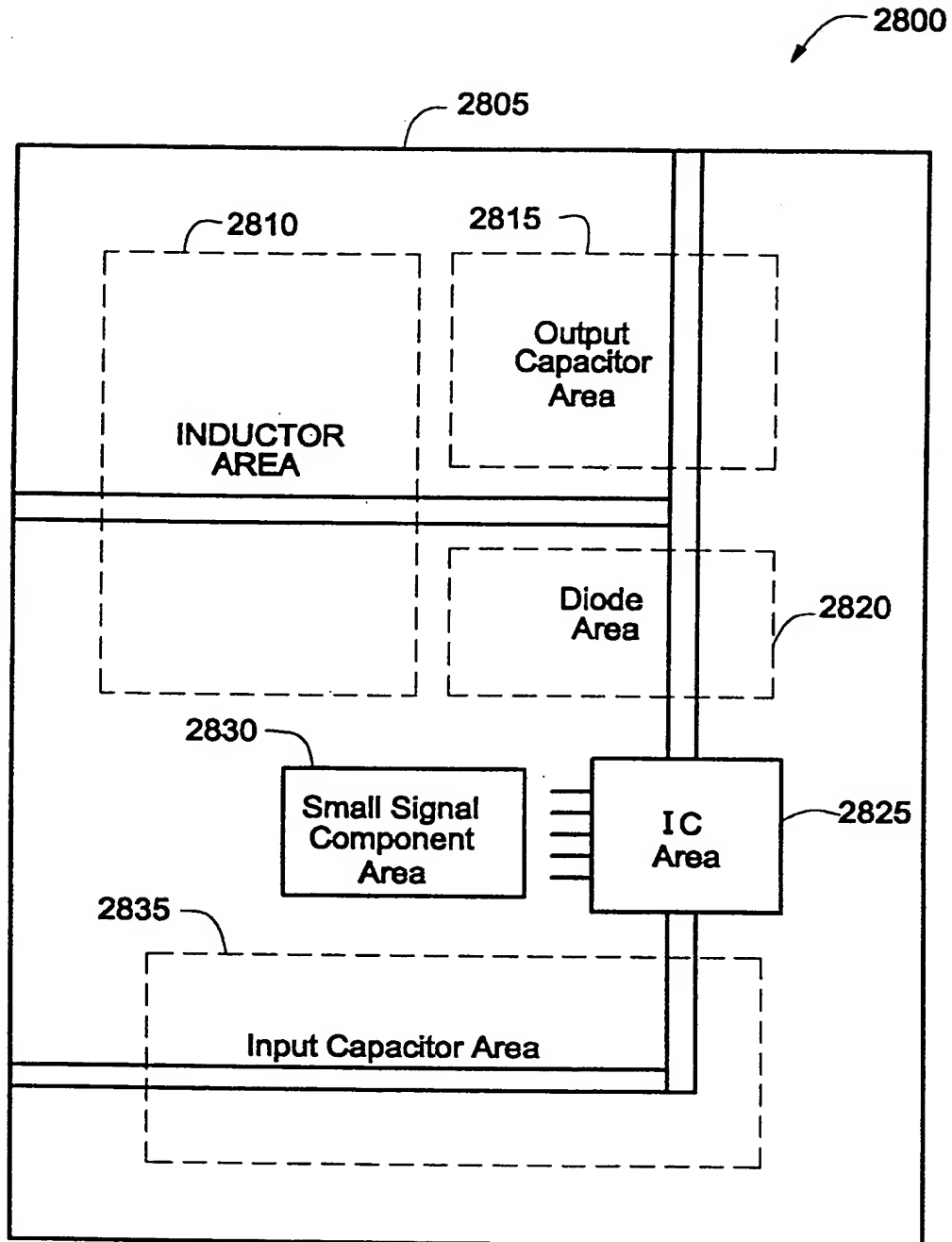


Figure 28

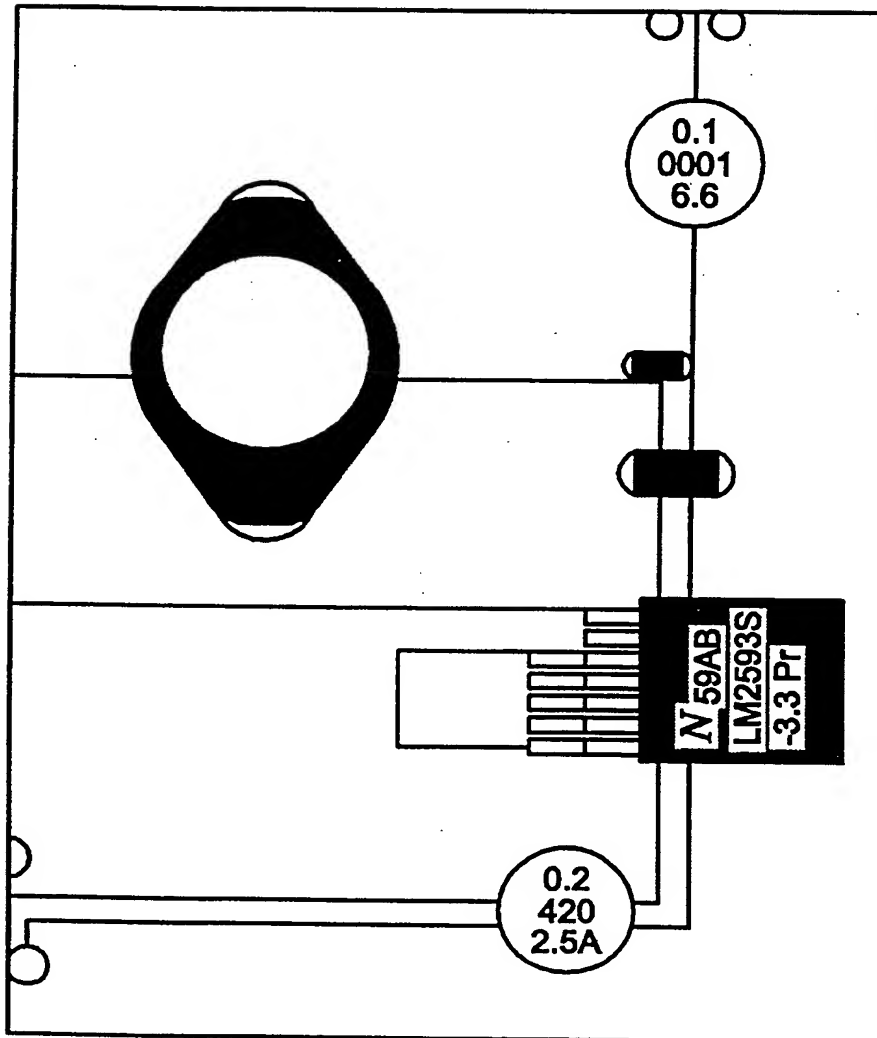


Figure 29A

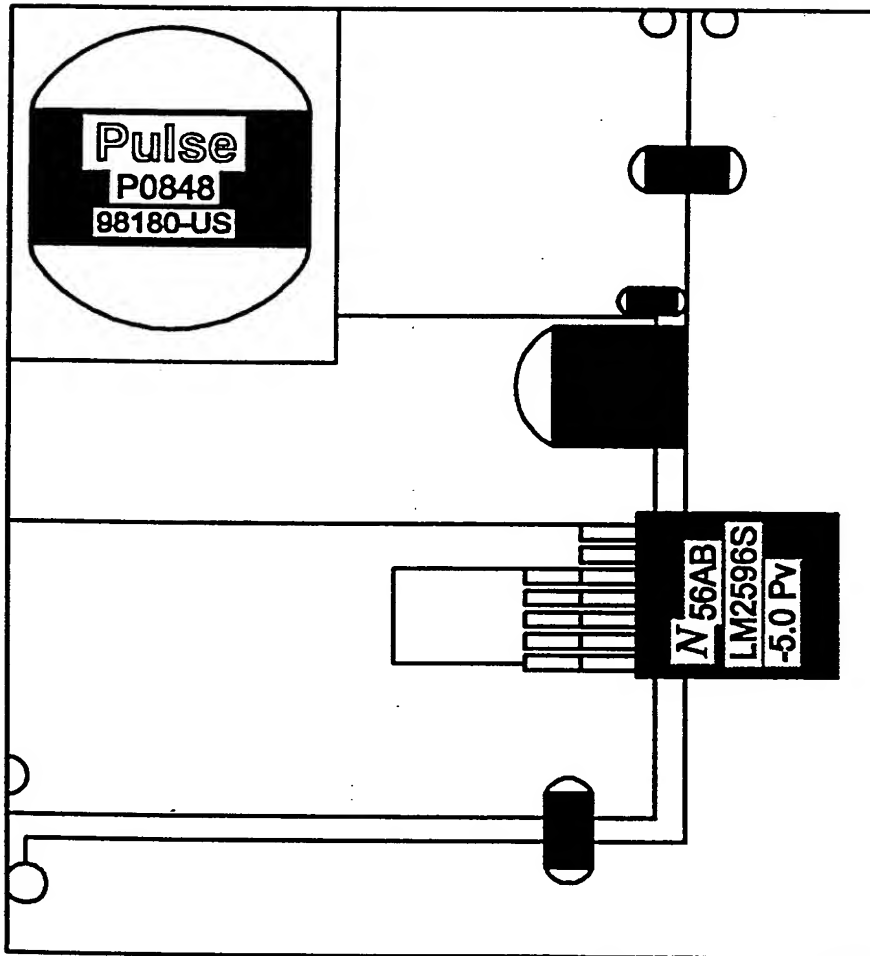


Figure 29B

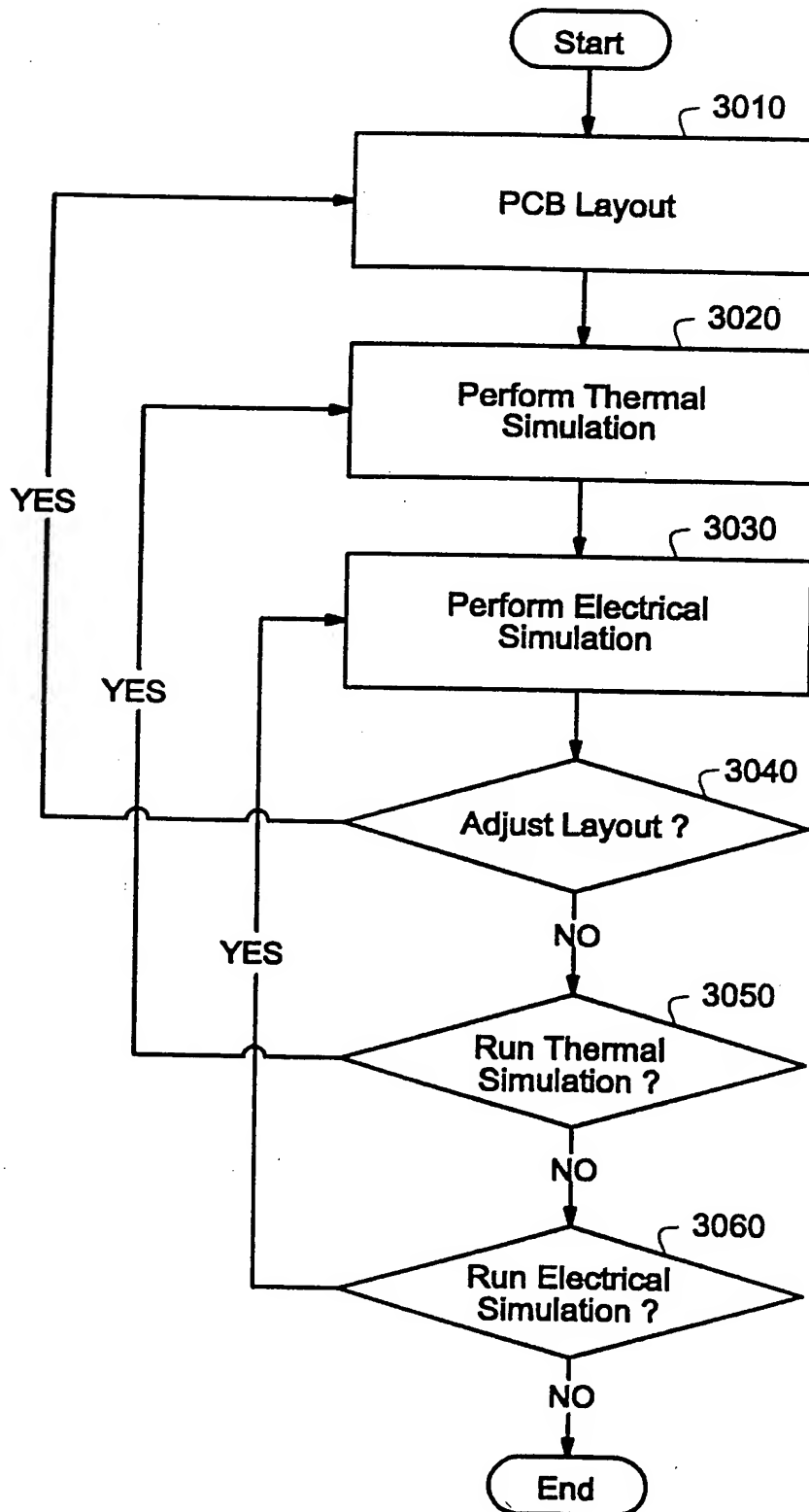


Figure 30

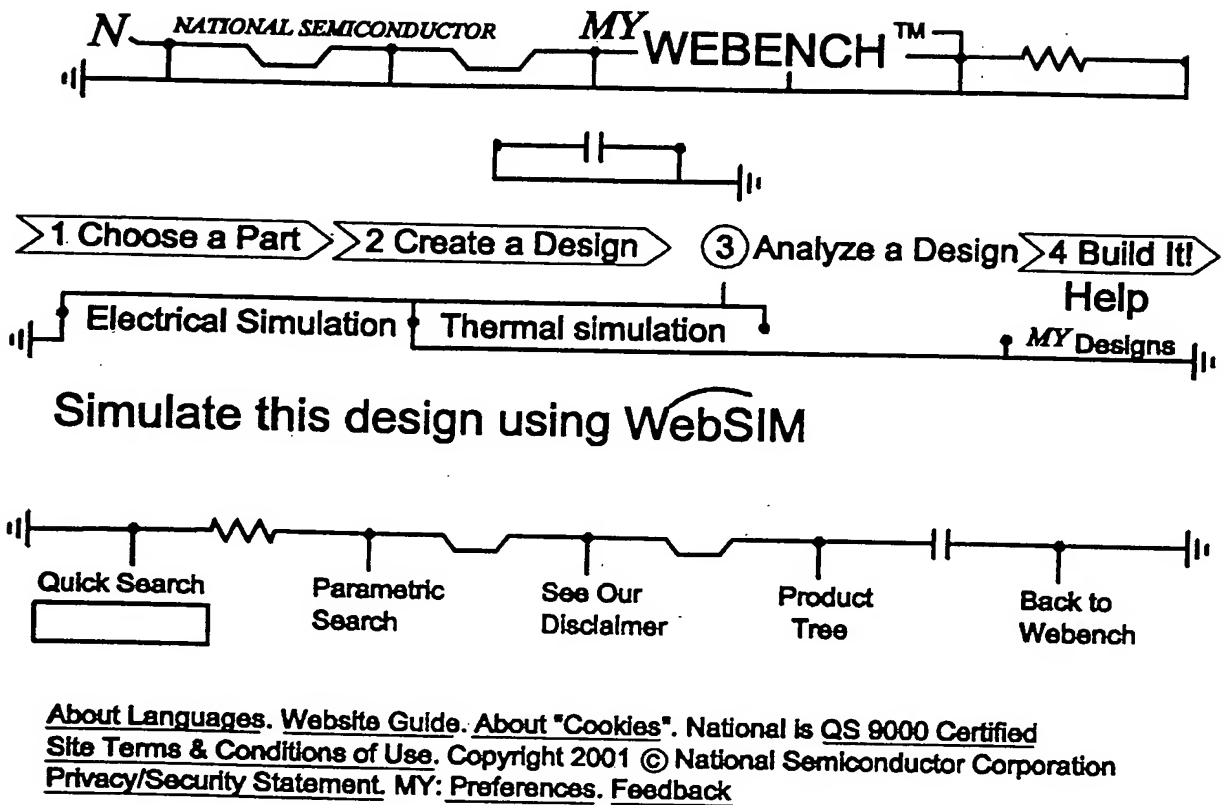
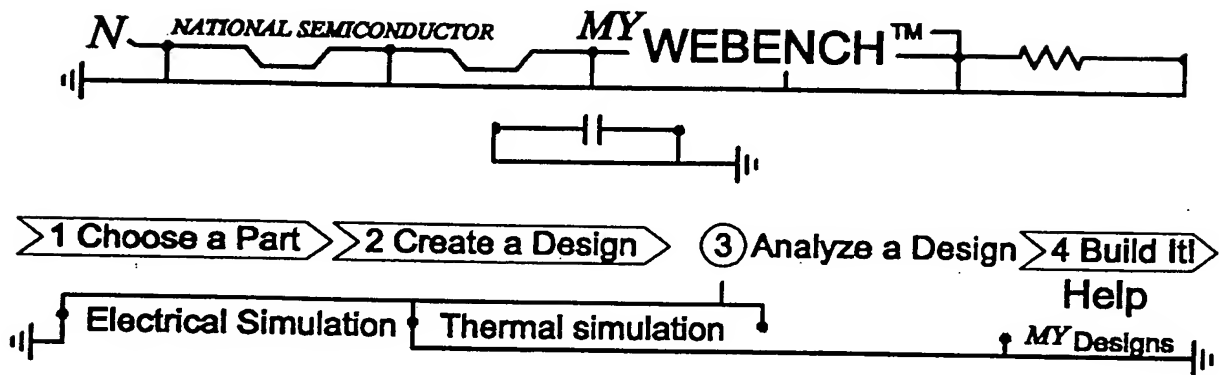


Figure 31



Simulate this design using WebSIM

WebSIM Simulations for Design ID 7

3210

#	Simulation ID	Date	Notes / Description
2	1010802011626869	Aug 1 2001 6 : 25PM pst	
1	1010802011426808	Aug 1 2001 6 : 23PM pst	



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Figure 32

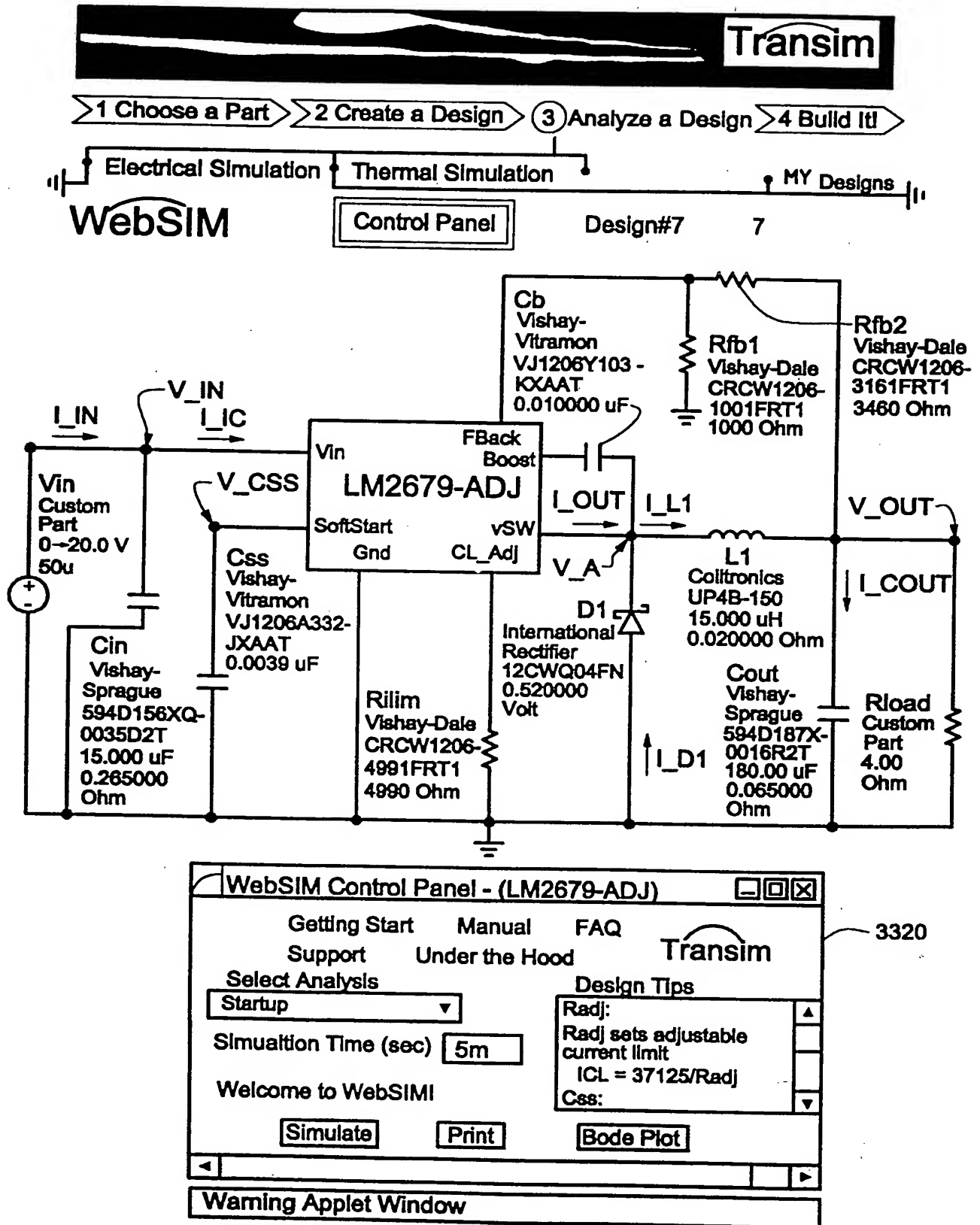


Figure 33

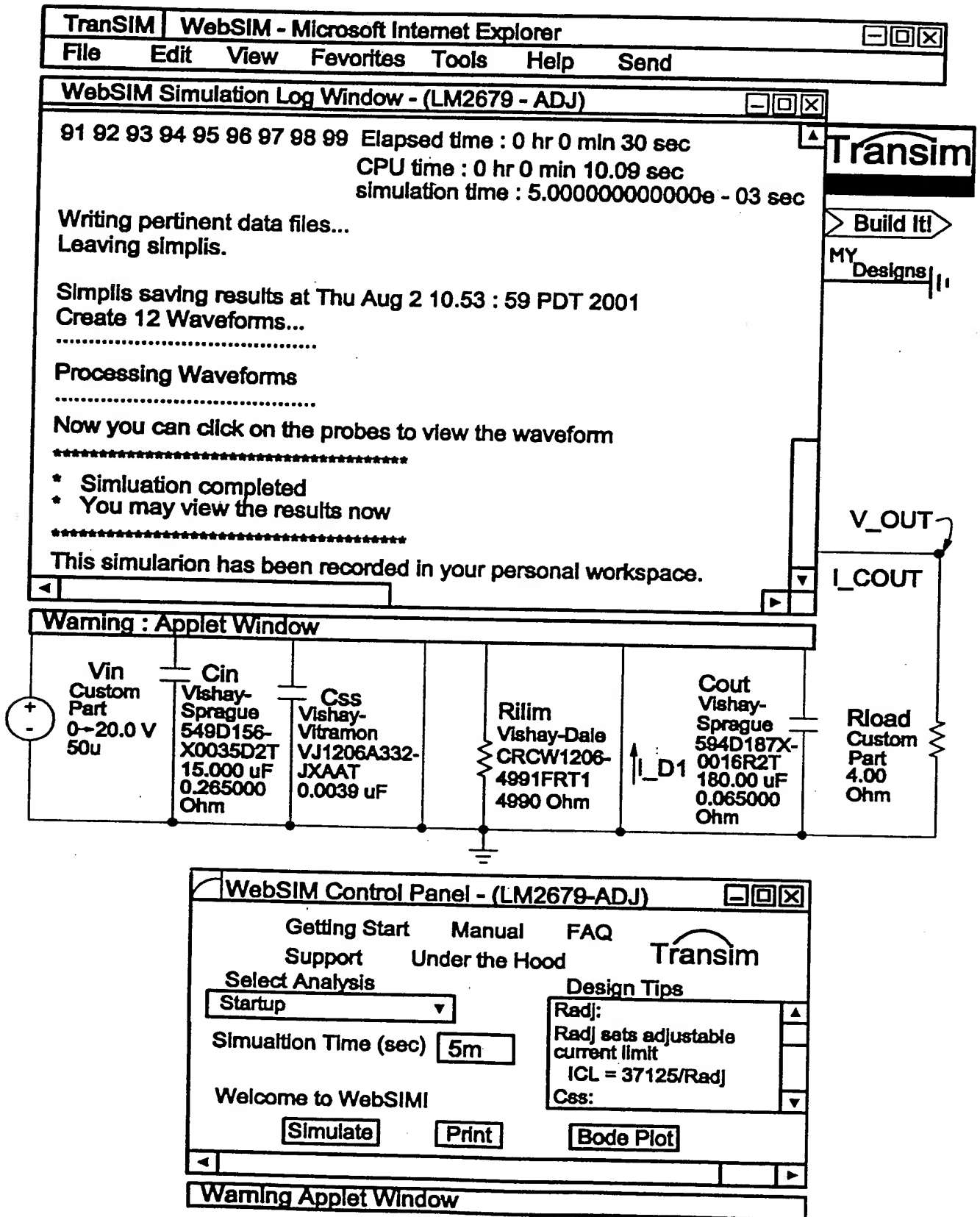


Figure 34

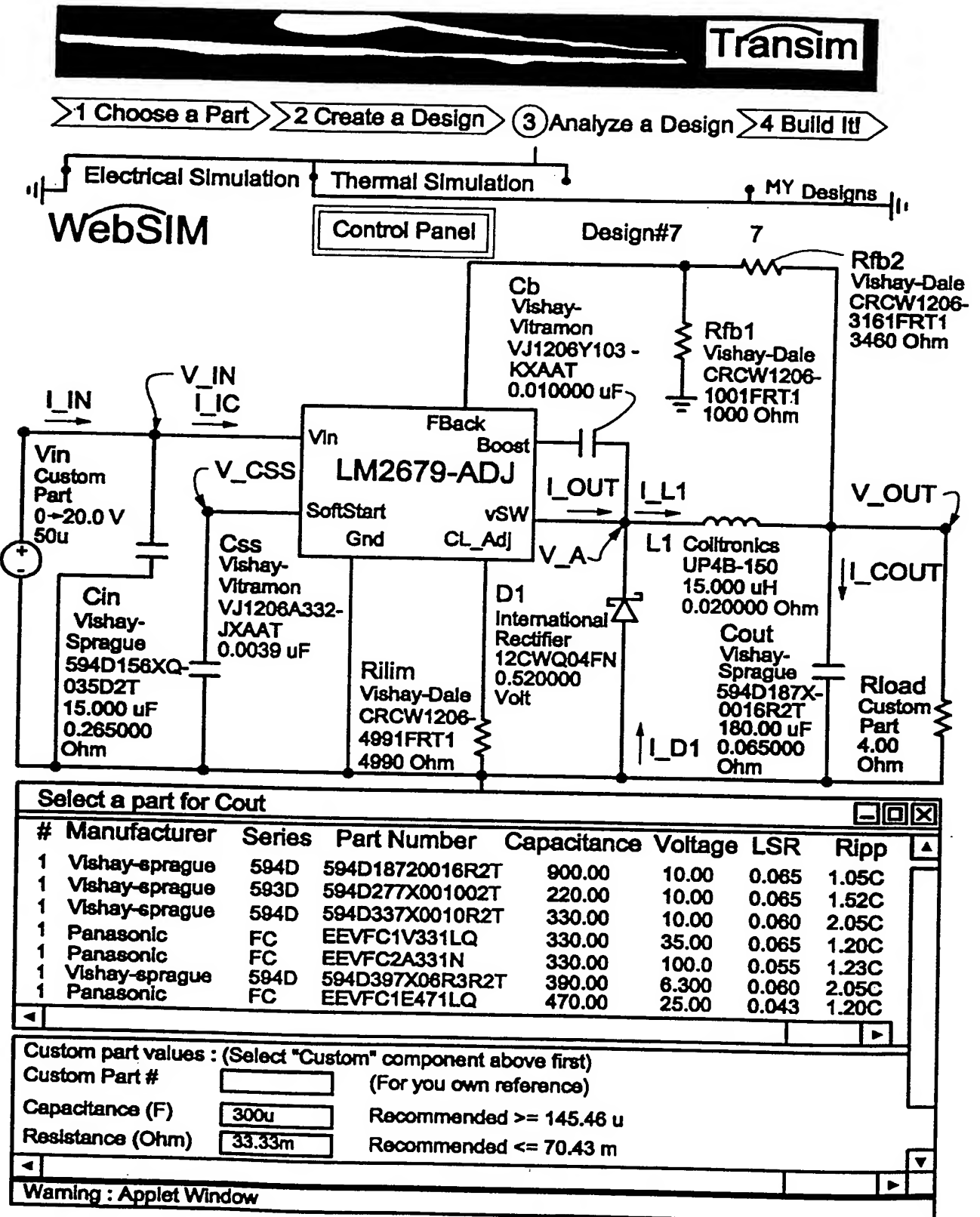


Figure 35

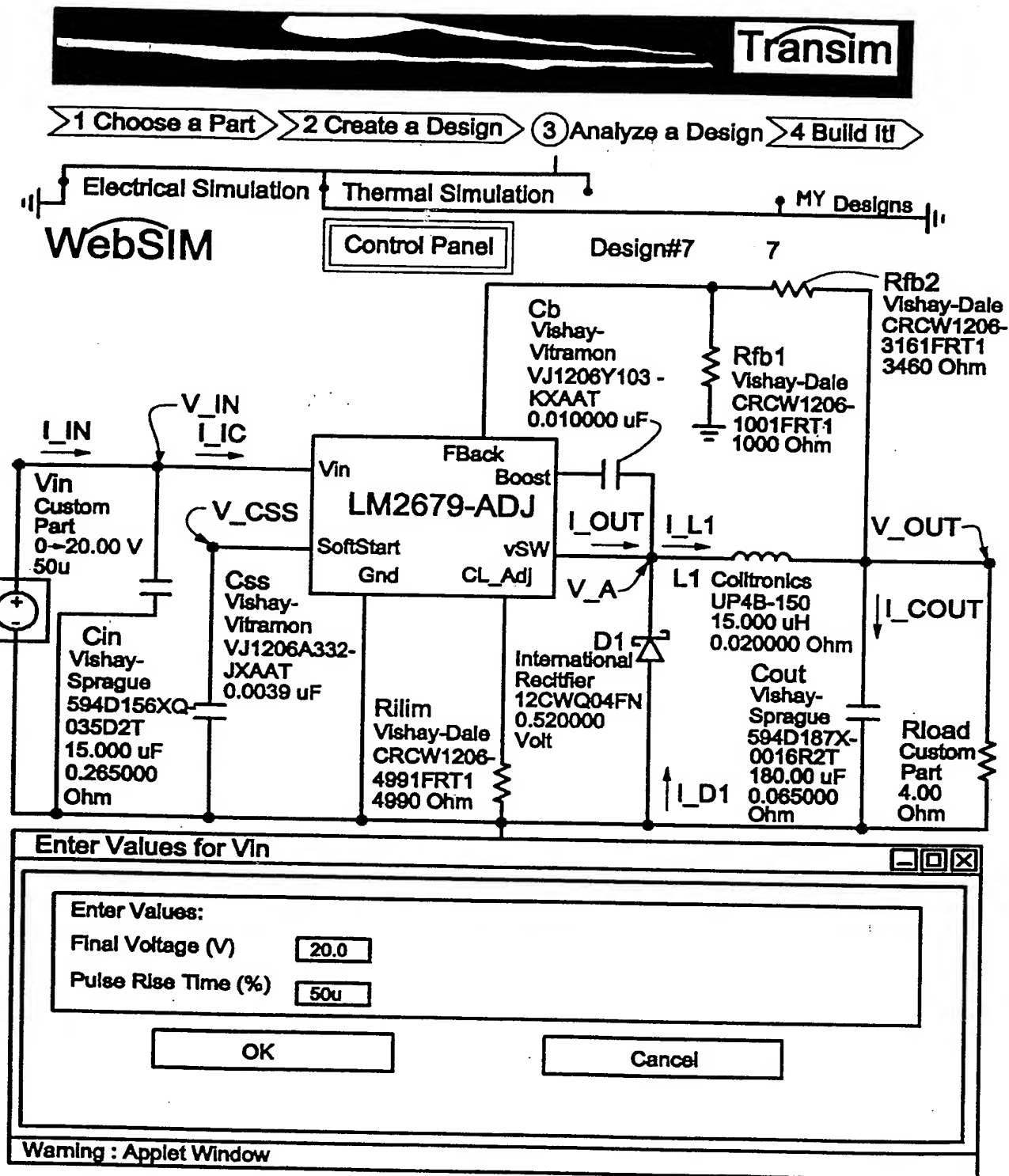


Figure 36

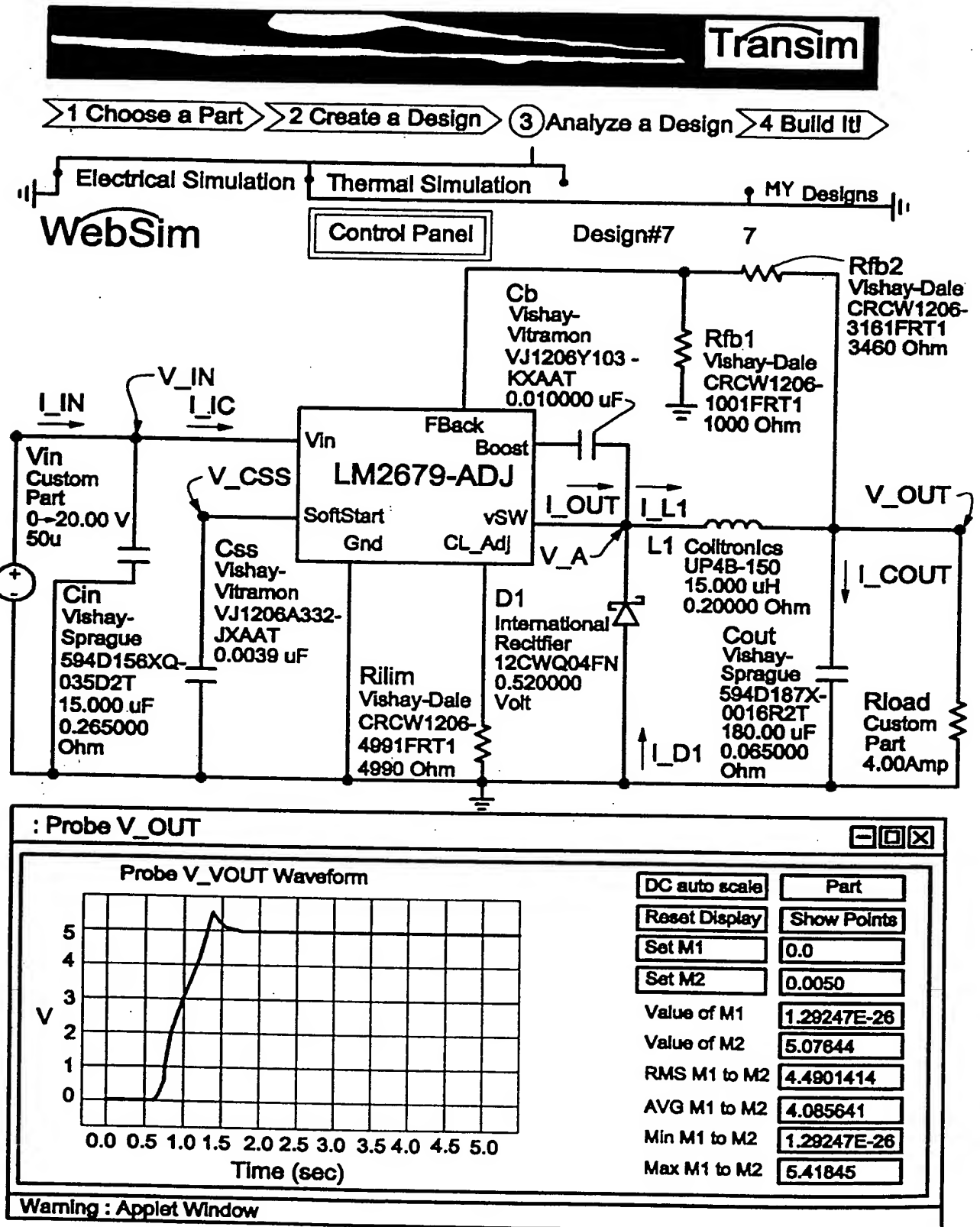


Figure 37

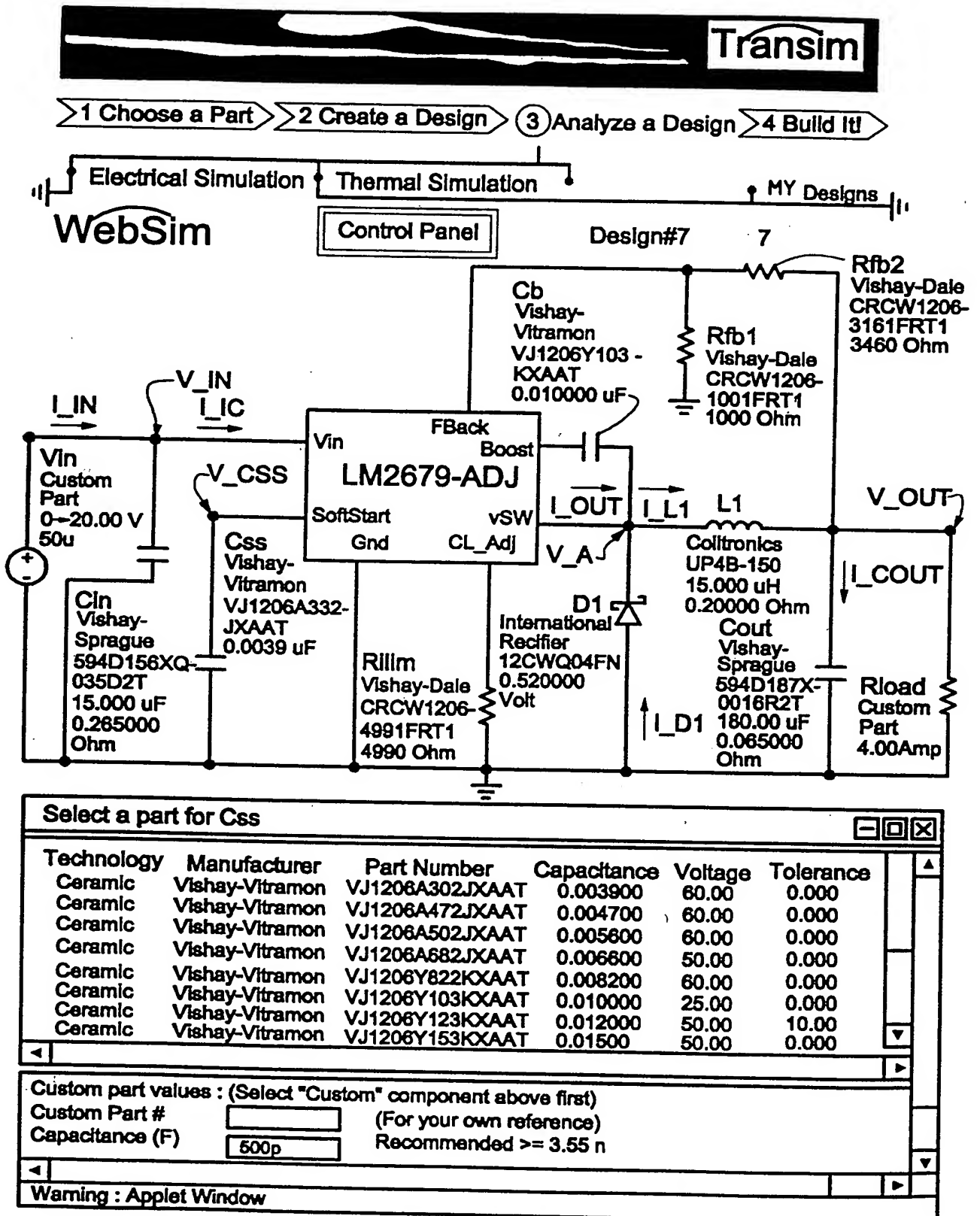


Figure 38

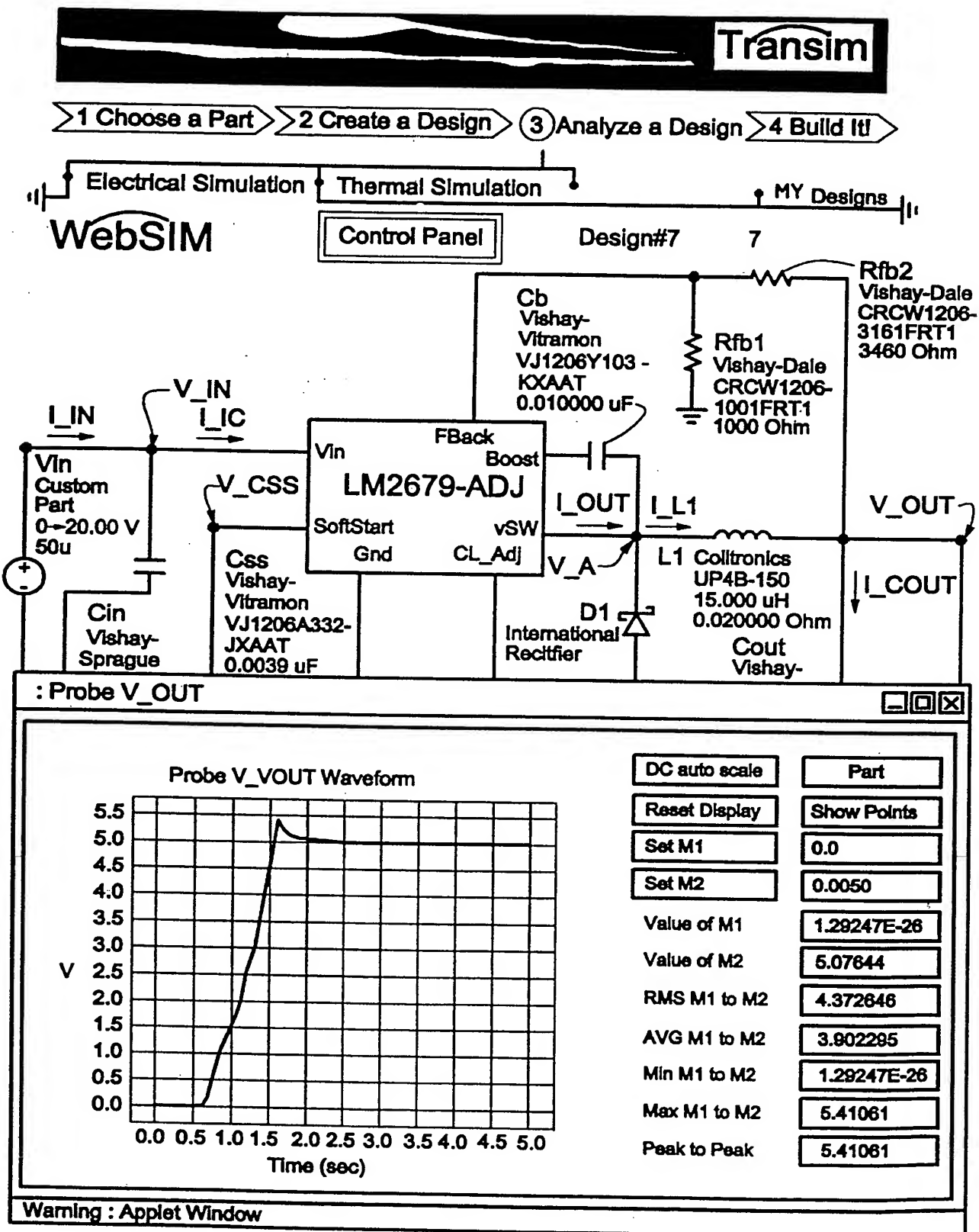


Figure 39

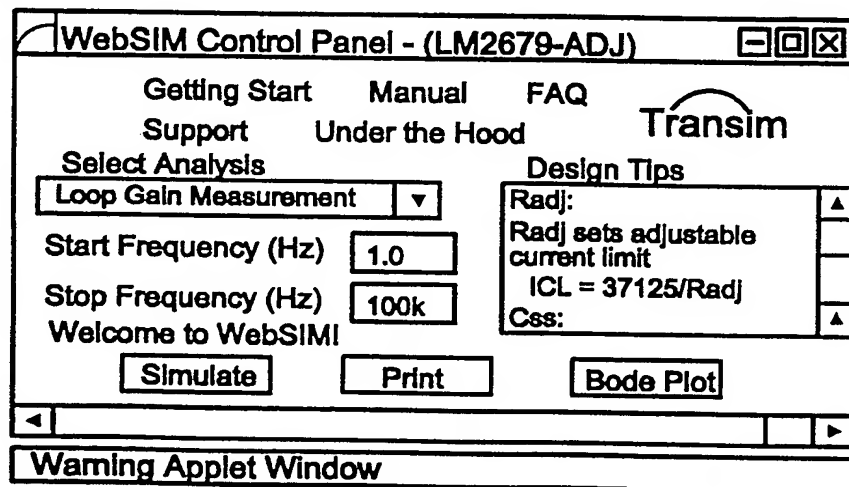
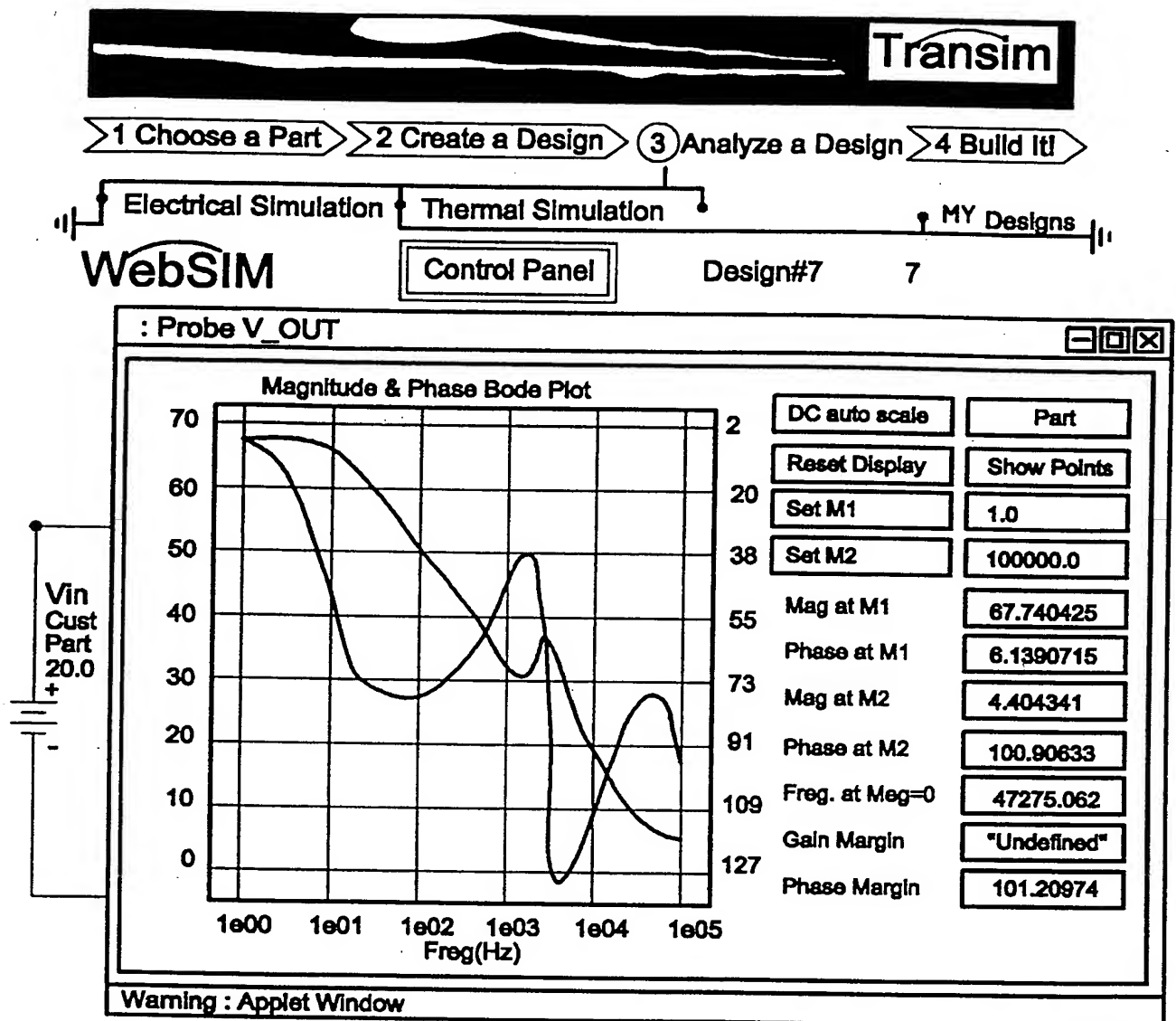


Figure 40

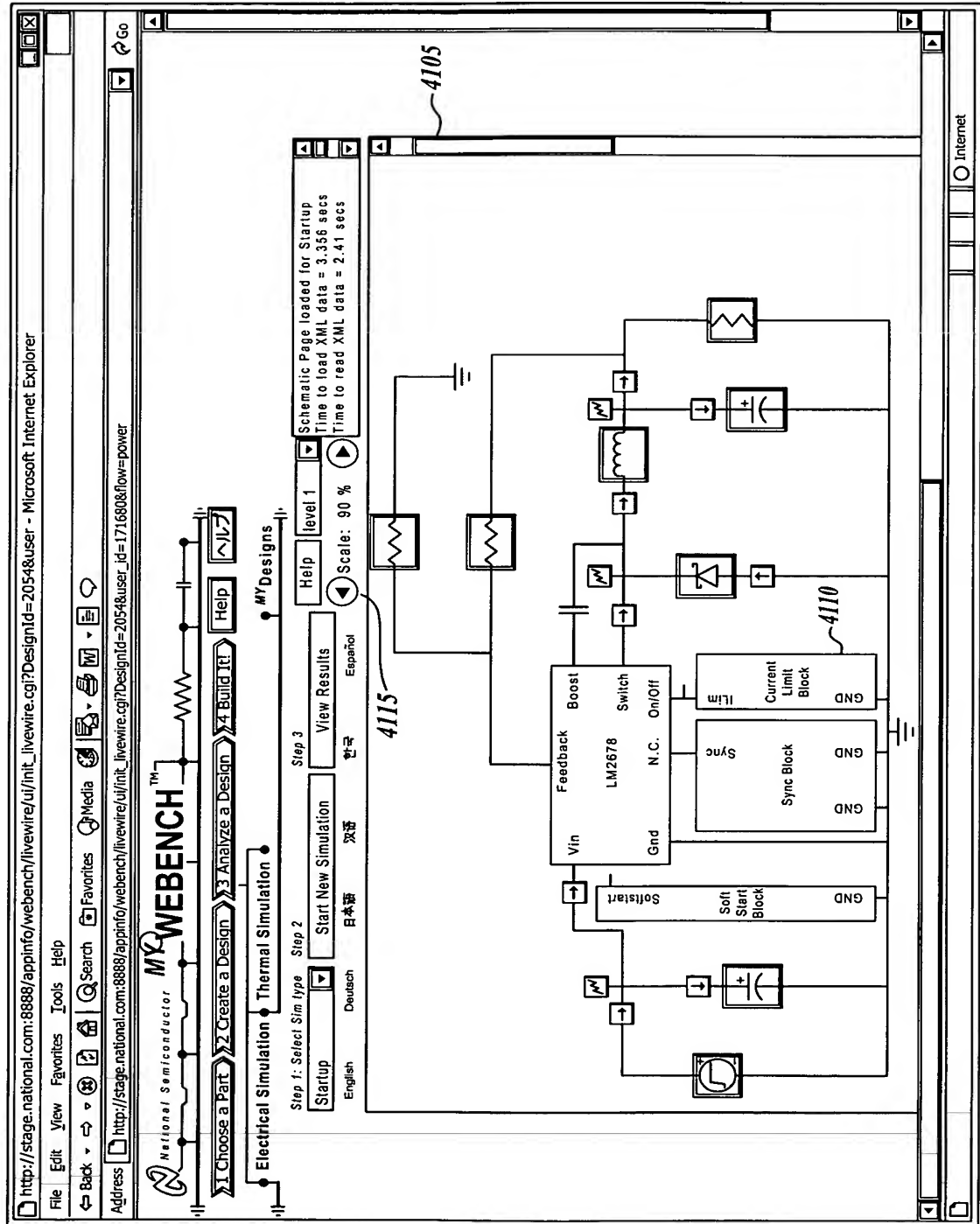
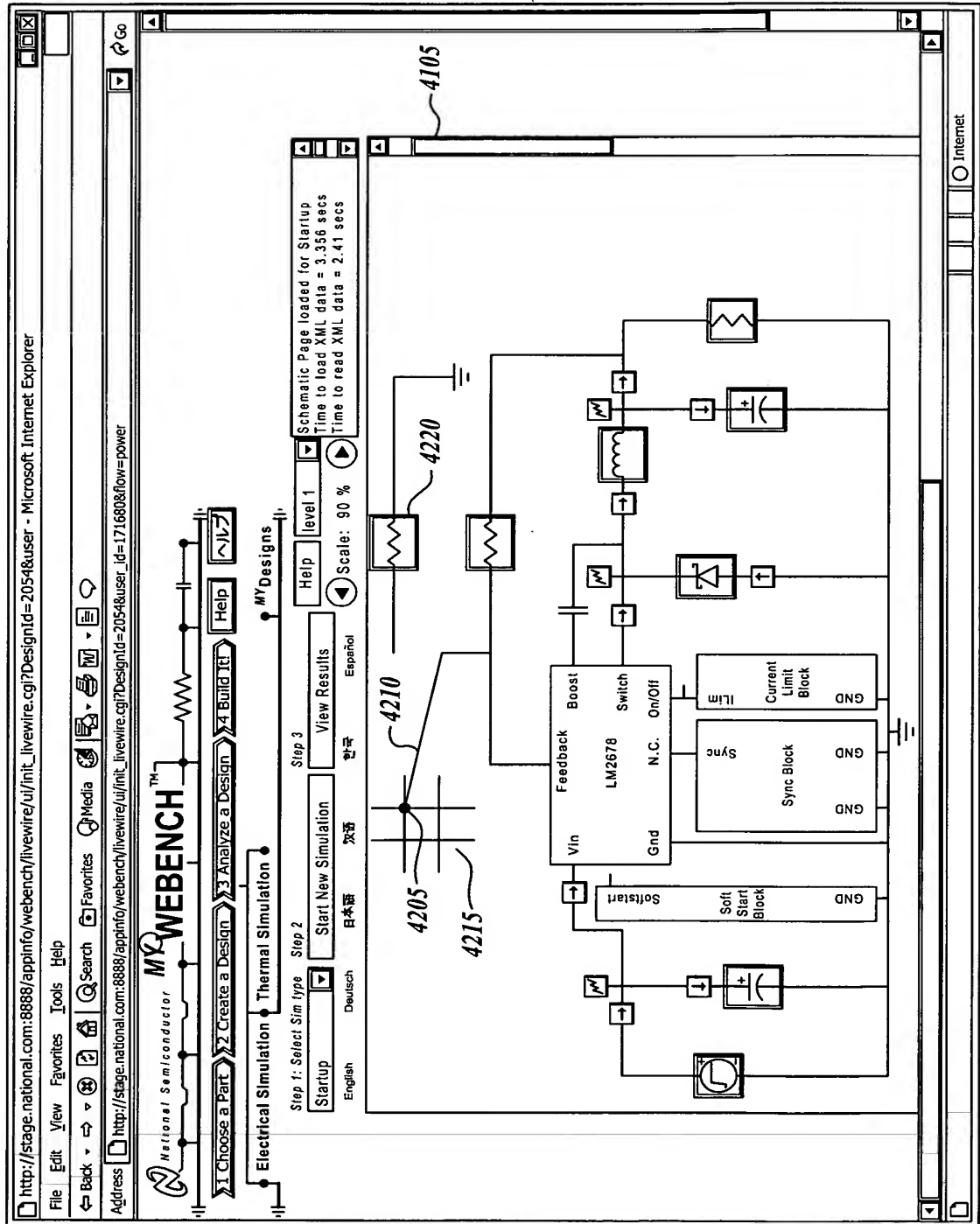


Fig. 41

Fig. 42



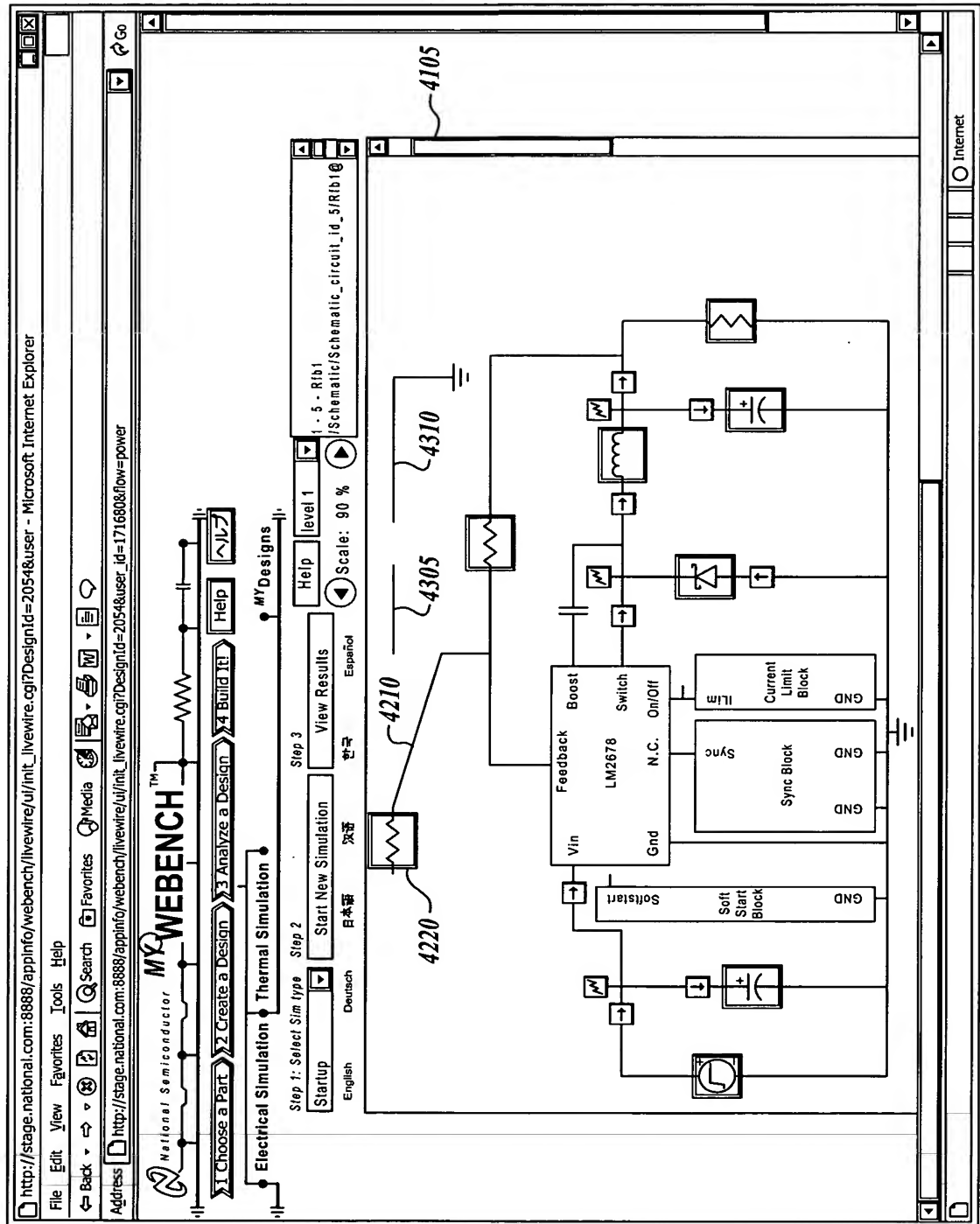
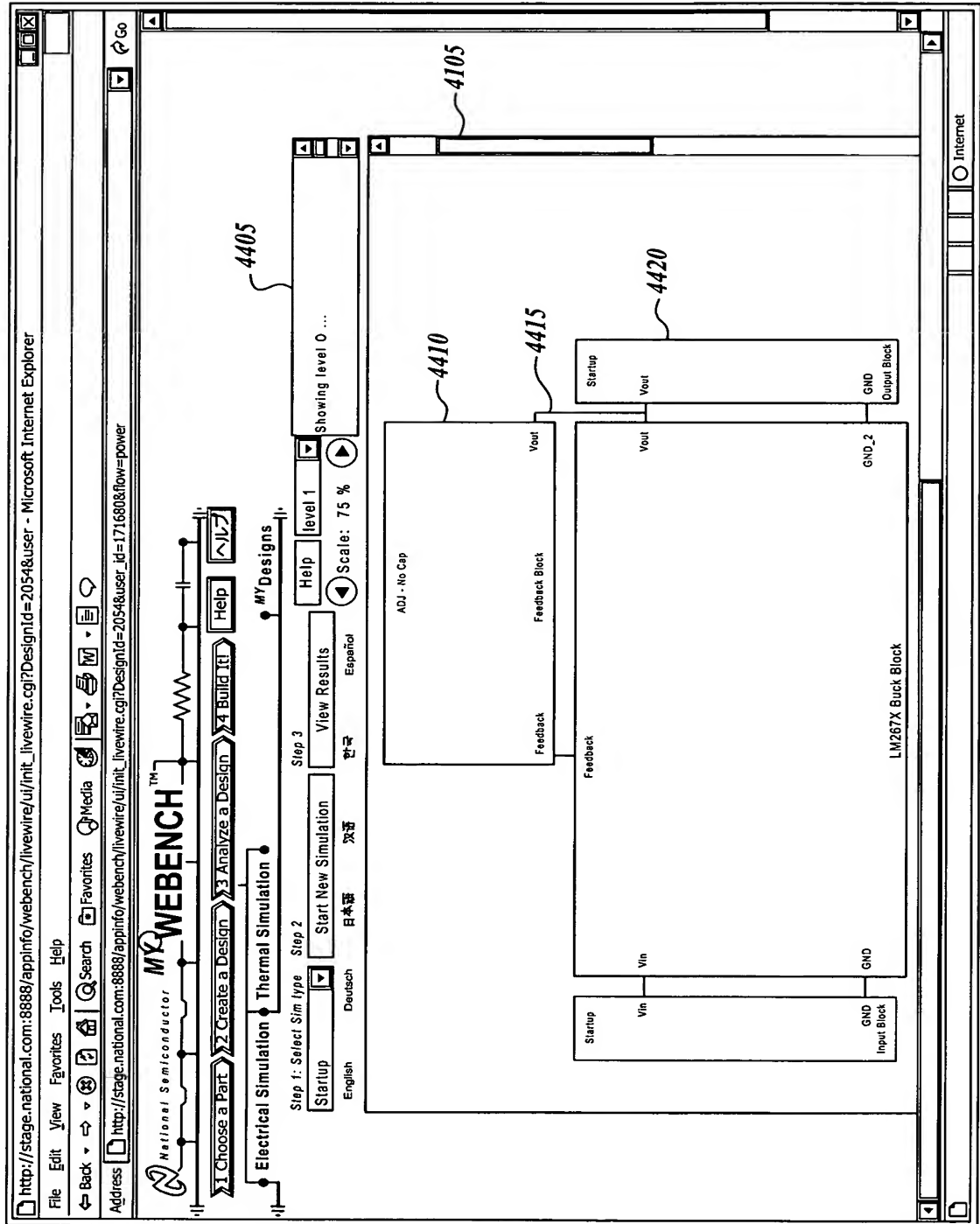


Fig. 43

Fig. 44



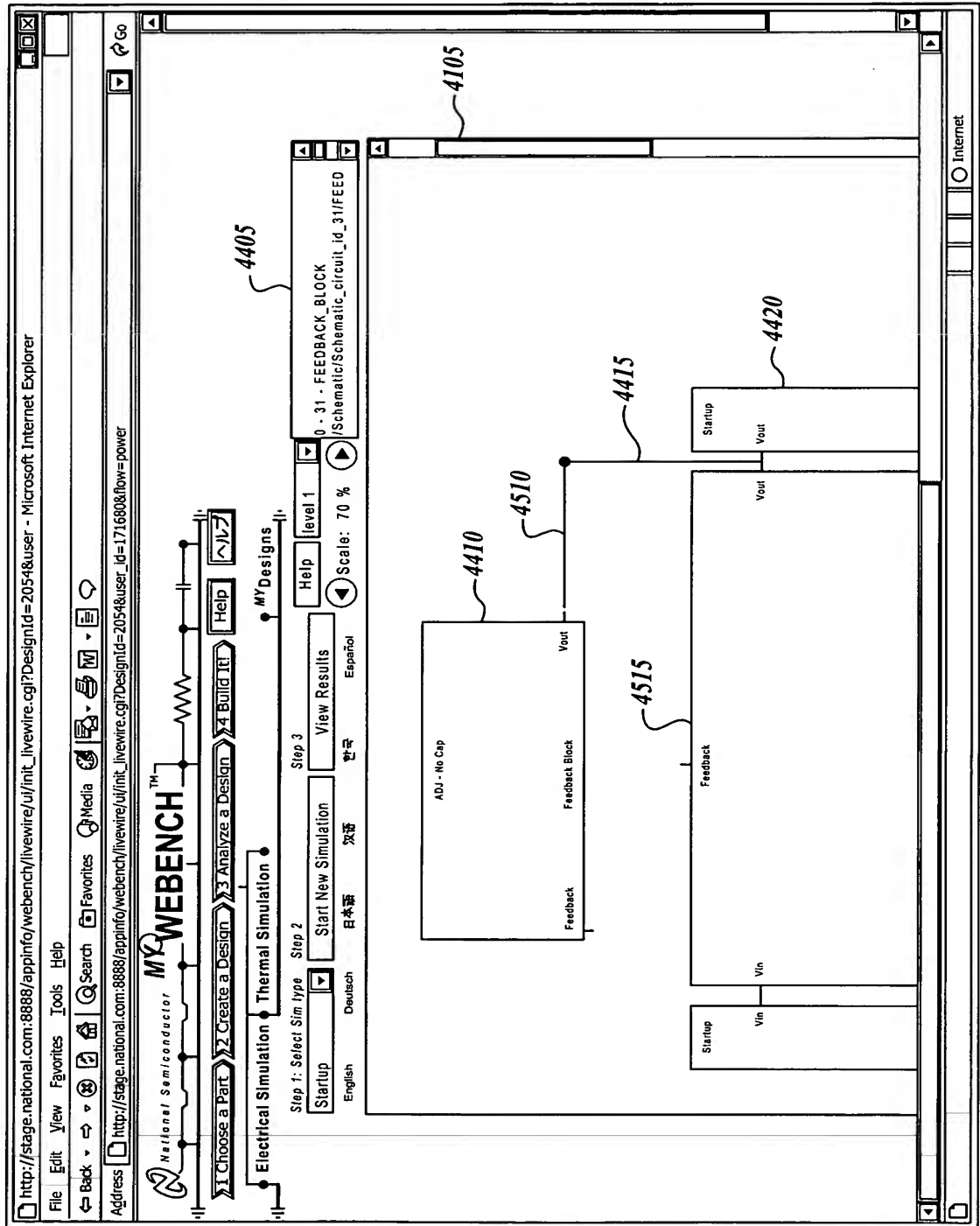


Fig. 45

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